4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter presents a discussion of the environmental impacts associated with the Proposed Action and alternatives presented in **Chapter 2.0**. Analysis of environmental impacts in this chapter is confined to that associated with new disturbances for each alternative.

4.1.1 Alternatives

The four alternatives analyzed in this section include the following:

- **Alternative A - Proposed Action** would include the development of up to 3,250 Green River oil wells and 2,500 vertical deep gas wells along with associated access roads, water-supply pipelines, gathering lines, compressor stations, water treatment facilities, GOSPs, and gas processing plant.
- **Alternative B - No Action Alternative** analyzes the effects of taking no action to implement the Proposed Action or other action alternatives. This alternative assumes that the development of oil and gas resources would continue on projects previously approved by BLM and would likely continue on State of Utah and private lands or minerals, subject to the approval of UDOGM or the appropriate private landowner or mineral rights owner. For purposes of analysis in this EIS, it is assumed that under the No Action Alternative, approximately 788 new wells and associated facilities would be completed.
- **Alternative C - Field-Wide Electrification Alternative** was developed in response to issues raised during the public and agency scoping process. The principal component of this alternative entails a phased field-wide electrification system that would be integrated in the MBPA over an estimated 7-year period. This alternative analyzes the impact of development of up to 3,250 Green River oil wells and 2,500 vertical deep gas wells and associated infrastructure and is virtually identical to the Proposed Action, except that gas-driven motors would be converted to electric motors as field-wide electrification is phased into the MBPA.
- **Alternative D - Agency Preferred Alternative** is the agency preferred alternative, which was developed in response to comments received during the agency and public scoping period. It was designed to minimize the amount of new surface disturbance within the Pariette Wetlands ACEC, Level 1 and 2 Core Conservation Areas for *Sclerocactus* species, and other portions of the MBPA through the use of directional drilling technology on new and existing multi-well pads. Alternative D analyzes the impact of drilling up to 3,250 Green River oil wells and 2,500 vertical or directionally drilled deep gas wells.

Each of the alternatives is discussed based on alternative-specific activities, schedule, design features, and surface disturbance. It should be noted that the proposed surface locations for well pads, pipeline corridors, utility corridors, access roads, and other surface facilities are conceptual at this point. These locations have been illustrated on the alternative-specific maps in this EIS (**Figures 2-1** through **2-4 – Attachment 1**) for analytical and impact evaluation purposes only. Actual locations for well pads, access roads, ROWs, and other surface facilities would be determined at the project implementation phase.

This EIS provides a large-scale or “big-picture” level of analysis in that the proposed surface locations for well pads, pipeline corridors, utility corridors, access roads, and other surface facilities are conceptual at this point. Because of the programmatic nature of this document, analysis requires that well locations be estimated based on existing foreseeable development scenarios. Surface disturbance calculations in this chapter are based on the alternative-specific conceptual development and disturbance calculations disclosed in Chapter 2. Potential disturbance from cross-country pipelines is not reflected in the resource-specific analyses in this chapter, as it was not feasible to map them conceptually. Therefore, resource-specific GIS calculations are not available. Once this project is implemented, individual well siting and associated effects would be determined through site-specific clearances associated with the APD process. These clearances would include site-specific biological, cultural, and paleontological surveys prior to construction, as directed by the BLM (see **Section 2.1**, *Management Actions Common to All Action Alternatives*). All required mitigation measures would be identified at that time.

4.1.2 Types of Impacts to be Addressed

Impacts are defined as modifications to the existing environment brought about by implementing an alternative. Impacts can be beneficial or adverse, can result from the action directly or indirectly, and can be long-term, short-term, temporary, or cumulative in nature. This analysis provides a quantitative or qualitative comparison between alternative-specific impacts, dependent on available data and nature of the impact, as well as establishes the severity of those impacts in the context of the existing environment. It also includes specifically required disclosures under NEPA, including the irreversible (resource use or environment cannot be restored) and irretrievable (resource value is lost until the environment is restored) commitment of resources and the impact of the Project's short-term resource use and the long-term productivity of the MBPA.

Direct impacts are attributable to implementation of an alternative that affects a specific resource and generally occur at the same time and place. Indirect impacts can result from one resource affecting another (e.g., soil erosion and sedimentation affecting water quality) or can occur later in time or removed in location, but are still reasonably foreseeable. Long-term impacts are those that would substantially remain for many years or for the LOP. Temporary impacts are short-term or ephemeral changes to the environment that revert to original conditions once the activity is stopped, such as air pollutant emissions caused by earthmoving equipment during construction. Short-term impacts result in changes to the environment that are stabilized or mitigated rapidly and are without long-term impacts. Cumulative impacts are the result of past, present, and reasonably foreseeable future actions by federal, state, and local governments, private individuals, and entities in or near the MBPA.

4.1.2.1 Unavoidable Adverse Impacts

Unavoidable adverse impacts are discussed in this section and throughout the chapter for each resource. These are adverse effects on natural and human resources that would remain even after mitigation measures have been applied. Mitigation measures may consist of existing regulatory requirements or other potential mitigation, including measures outside the jurisdiction of the lead or cooperating agency. This section of the EIS indicates the effectiveness of proposed mitigation measures for each resource and helps the decision maker identify those mitigation measures that are to be included in a ROD.

4.1.2.2 Irretrievable and Irreversible Commitment of Resources

Irreversible and irretrievable commitments of resources (or, irreversible and irretrievable impacts) are disclosed in this section and throughout the chapter for each resource. An irreversible or irretrievable commitment of resources refers to impacts on or losses of resources that cannot be recovered or reversed. Examples include permanent conversion of wetlands or the loss of cultural resources, soils, or wildlife. The losses are permanent. Irreversible is a term that describes the loss of future options. It applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors that are renewable only over long periods of time, such as soil productivity. Irretrievable is a term that applies to the loss of production or use of natural resources. For example, some of the wildlife habitat in the MBPA is lost irretrievably while the wells are in production.

4.1.2.3 Relationship of Short-Term Uses to Long-Term Productivity

The relationship of how short-term project use would affect long-term productivity is described in this section and throughout the chapter for each resource.

4.2 AIR QUALITY

This air quality environmental impact assessment is supported by the AQTSD contained in **Appendix B**. The AQTSD presents the detailed emission inventories and associated air quality impact assessment (AQIA). The AQIA was conducted in four major steps:

- Develop evaluation criteria.
- Develop emissions inventories.
- Evaluate the potential impact of emissions through the use of near-field and far-field dispersion models, AERMOD, and CALPUFF.
- Compare the impacts to the evaluation criteria.

The evaluation criteria and methodology for determining the pre-project (background) air quality were discussed in **Section 3.2**.

Emission inventories were completed for the Proposed Action and alternatives. The key variables used in preparing the emission inventories include the following:

- Number of oil and gas wells drilled and developed (as specified for each alternative).
- Nature of construction activities associated with well sites (e.g., activity types such as bulldozing, duration of each activity, road and pipeline construction, etc.).
- Production rate of the oil and gas wells.
- Nature of the oil and gas produced (e.g., expected gas-to-oil ratios and gas and oil composition).
- Types and sizes of equipment used at each well site to produce the oil and gas (e.g., 0.5 million Btu per hour (MMBtu/hr) heaters at each oil well).
- Nature of operational activities at each well site (e.g., storage tanks on site and pumper truck emissions associated with oil transport).
- Infrastructure for each alternative (e.g., number and size of compressor stations and gas oil separator plants).
- ACEPMs that would be used under the alternatives to reduce emissions (discussed in **Section 2.2.12.1**).
- Regulatory programs that require emission reductions.

Details on the preparation of the emission inventories are found in the AQTSD, and the equations and parameter values used to calculate the inventories are detailed in the AQTSD appendices. Four sets of emission inventories were prepared - one for each alternative. In addition, a set of annual development inventories was prepared to evaluate the potential for an increase in emissions from the Proposed Action over the No Action Alternative, as discussed in **Sections 4.2.1.1.1** and **4.2.1.1.5**.

The impact assessment methodology is discussed in detail in the AQTSD. The methodology used local meteorological data obtained at Vernal, Utah, and background air quality data for the region (discussed in **Appendix B, Section 3.2**), coupled with EPA and DAQ-approved dispersion models (AERMOD and CALPUFF) to assess the impacts of the emissions. Two sets of impact models were run - one for Alternative A, and the other for Alternative C. Alternative C was evaluated with dispersion models, because it proposes electrical generating stations that could have different impacts from Alternative A. Alternatives B and D would have lower emissions, and thus the impacts would be the same or lower than for Alternative A or C. The impact models assessed the near-field (less than 50 km) and far-field (e.g., distant Class I and sensitive Class II areas) impacts of criteria pollutant emissions and near-field impacts of hazardous air pollutants. The impact models were run for both 20-acre downhole spacing and 40-acre downhole spacing scenarios for oil and gas wells. The modeling scenarios used a maximum impact combination of activities in close proximity (e.g., producing oil and gas wells near operating compressor stations near new well drilling and development). The scenarios are described in the AQTSD.

As discussed in **Section 4.2.1.1.5**, no project-specific ozone impact modeling has been conducted, because the tools needed for such modeling are not yet available. However, the Greater Natural Buttes Final Environmental Impact Statement analyzed the potential for ozone formation in the Uinta Basin, and that analysis included Newfield's project, as discussed in **Section 4.2.1.1.5**. In addition, as shown in the following sections, emission increases under any of the Action Alternatives would be less than the No Action Alternative for the first few years of the Project. Nevertheless, because any of the Action Alternatives would eventually result in ozone precursor emissions greater than the No Action Alternative, BLM would implement an Adaptive Management Strategy to mitigate the potential for adverse ozone formation (see **Section 4.2.1.1.6**). The Adaptive Management Strategy for potential adverse ozone formation is also discussed in **Section 2.2.11**.

The following sections discuss the air quality impact assessment methodology and results.

4.2.1 Direct and Indirect Effects

4.2.1.1 Alternative A - Proposed Action

Pollutant emissions have the potential to affect air quality on both a local and a regional scale. Emission inventories for the criteria pollutants NO_X, CO, SO_2, PM_{10}, $PM_{2.5}$, HAPs, and VOCs were calculated for the development, operation, and infrastructure related activities for Alternative A, as shown in the AQTSD (see **Appendix B**). The emission inventories were then used as input to dispersion models to assess the potential impacts of Alternative A, as reported in the AQTSD.

4.2.1.1.1 Emissions

Emissions occur during two primary phases of the Proposed Action: the construction and development phase, and the operations phase. The construction and development phase includes emissions from the following activities:

- Construction
- Drilling

- Completion
- Interim reclamation
- Wind erosion

The operations or production phase includes emissions from:

- Pump unit engines
- Production heaters
- Well site tanks
- Pneumatics
- Fugitive emissions of VOCs
- Well site truck loading emissions
- Well site flares
- Operations vehicle fugitive dust and tailpipe emissions

In addition to the construction and development and the operations phases, infrastructure must be built to serve the operating wells. Infrastructure emissions include the following:

- Water treatment facility oil tanks, fugitive emissions of VOCs and emissions from gas generators
- GOSPs, including truck loading emissions
- Compressor station emissions, including engines, tanks, dehydrators, flares and fugitives
- Gas processing plant emissions, including dehydrators, compressor engines and fugitives

Table 4.2.1.1.1-1 summarizes the annual emissions associated with various phases and activities proposed in Alternative A. The summaries come from the AQTSD. The individual HAPs shown in the tables are those that are most meaningful based on largest emission quantities coupled with the lowest thresholds for potential adverse health effects that are discussed in **Appendix B, Section 3.2**, specifically benzene, toluene, xylene, n-hexane, formaldehyde, and acrolein. Ethylbenzene is also associated with oil and gas development, but ethylbenzene emissions are very small compared to the other HAPs listed in **Table 4.2.1.1.1-1**. Ethylbenzene emissions are quantified and reported in the appendices to the AQTSD. Emissions for each of the activities within the three primary phases (e.g., pumpjack engines, well site heaters, stock tanks, etc.) are detailed in the appendices to the AQTSD. GHG emissions include emissions of natural gas that could occur during well drilling and completion.

The emissions shown in **Table 4.2.1.1.1-1** include the benefit of the ACEPMs and regulatory requirements under the recently promulgated (August 16, 2012) New Source Performance Standard for oil and gas operations (Oil and Gas NSPS), published as 40 CFR 60 Subpart OOOO. The emissions do not include the benefit of emission reductions that will be required under the State of Utah General Administrative Order DAQE-ANI49250001-14, and the tribal New Source Review (NSR) programs promulgated in 2014. These programs require additional emission reduction measures for the Proposed Action. These programs will likely require additional emission reduction measures for the Proposed Action. The emissions also do not include emission reductions that could occur under the Adaptive Management Strategy to mitigate potential ozone formation (see **Section 4.2.1.1.6**).

The benefit of the emission reductions required by the Oil and Gas NSPS and the ACEPMs are shown in **Table 4.2.1.1.1-2**. Details as to how the benefits were calculated are shown in Section 6 of the AQTSD.

The emissions in **Table 4.2.1.1.1-1** represent the emissions that could occur in a maximum emissions year if the Proposed Action is fully developed. The maximum emissions year assumes that all of the proposed wells (5,750 wells) have been drilled and are operating during that year normal drilling operations (approximately 360 wells per year) are conducted. This is a conservatively high combination of emissions and is not likely to occur. In addition, it would require at least 16 years to reach the full development and maximum emissions assumed for **Table 4.2.1.1.1-1** (5,750 wells divided by 360 wells per year equals approximately 16 years). Accordingly, emission increases for the MBPA have also been estimated on an annual development basis.

Annual development emissions for NOx and VOC from the Proposed Action were estimated on an annual basis for calendar years 2012 through 2022. The annual development emissions are shown in **Table 4.2.1.1.1-3**. Only NOx and VOC emissions were estimated on an annual basis, because they are the pollutants thought responsible for ozone formation in the Uinta Basin. The annual development emissions for 2012 through 2022 provide a 10-year view of how emissions would increase as the Proposed Action is developed. As indicated, it would require at least 16 years to reach full development of the Proposed Action.

TABLE 4.2.1.1.1-1
PROPOSED ACTION MAXIMUM EMISSIONS YEAR

POLLUTANT	WELL DEVELOPMENT (tpy)	WELL PRODUCTION (tpy)	INFRA-STRUCTURE (tpy)	TOTAL EMISSIONS (tpy)	WELL DEVELOPMENT (tpy)	WELL PRODUCTION (tpy)	INFRA-STRUCTURE (tpy)	TOTAL EMISSIONS (tpy)	TOTAL EMISSIONS (tpy)
Criteria Pollutants									
	Oil Wells				Gas Wells				Project Total
NO_x	129.6	1,809.7	981.0	2,920.2	668.6	511.1	1,590.2	2,769.9	5,690.1
CO	106.0	2,290.7	1,782.8	4,179.6	594.3	523.1	3,226.8	4,344.2	8,523.8
VOC	12.1	3,929.0	1,109.2	5,050.3	35.9	3,795.8	1,479.0	5,310.6	10,360.9
SO_2	0.2	3.9	2.8	6.9	1.2	2.9	3.4	7.5	14.4
PM_{10}	423.3	570.3	393.2	1,386.7	1,145.1	283.0	88.8	1,516.9	2,903.6
$PM_{2.5}$	46.0	224.1	95.6	365.8	128.4	61.8	60.9	251.2	617.0
HAPs									
	Oil Wells				Gas Wells				Project Total
Benzene	0.084	16.25	5.61	21.95	0.52	26.15	13.95	40.62	62.57
Toluene	0.031	12.01	3.93	15.98	0.19	48.84	10.89	59.92	75.90
Xylene	0.020	3.63	1.08	4.73	0.13	37.30	2.51	39.94	44.67
Formal-dehyde	0.0080	182.68	49.38	232.07	0.053	0.36	148.50	148.92	380.99
Acrolein	0.00080	25.71	5.40	31.12	0.0053	---	14.47	14.48	45.60
Total HAPs	0.26	446.77	107.16	554.19	1.05	211.21	238.28	450.54	1,004.73
GHGs and Global Warming Potential									
	Oil Wells				Gas Wells				Project Total
CO_2	18,776	780,830	597,890	1,397,495	116,923	602,127	714,145	1,433,195	2,830,690
CH_4	18.81	3,816	668	4,502	4.60	7,152	928	8,085	12,587
N_2O	0.15	1.47	1.11	2.73	0.93	1.13	1.34	3.40	6.13
GWP	19,218	861,421	612,256	1,492,895	117,308	752,679	734,054	1,604,041	3,096,936

TABLE 4.2.1.1.1-2
BENEFIT OF ACEPMS FOR NO_X AND VOC EMISSIONS
FOR THE PROPOSED ACTION DURING THE MAXIMUM EMISSIONS YEAR

Key NOx and VOC ACEPM	**NOx without ACEPM** (tpy)	**NOx with ACEPM** (tpy)	**ACEPM NOx Benefit** (tpy)	**Percent NOx Reduction**	**VOC without ACEPM** (tpy)	**VOC with ACEPM** (tpy)	**ACEPM VOC Benefit** (tpy)	**Percent VOC Reduction**
Pumpjack Engines	2,836	1,465	-1,371	48%	827	397	-430	52%
Tank Controls (GOSP, centralization, and/or flares)	0	1.7 (from flares)	+1.7	N/A	8,304	3,488	-4,816	58%
Tier 4 Drill Rig Engines	1,132	613	-519	46%	236	33	-203	86%
Dehydrator Still Vent Emission Control	0	20 (from flares)	+20	N/A	946	47	-899	95%
Shut-in Wells or Convert Wells to Waterflood Injection	1,256	0	-1,256	100%	1,868	0	-1,868	100%
Total	**5,224**	**2,100**	**-3,124**	**60%**	**12,181**	**3,965**	**-8,216**	**67%**

Note: The ACEPM benefits compared to no ACEPMs in this table were calculated as follows and as explained in detail in Section 6 of Appendix B:

- 3,250 new pumpjack engines (100 percent) compared to 31 percent new without the ACEPMs.
- 1,800 tanks controlled by GOSPs or VRU/smokeless combustors plus an additional 724 wells sharing 2 tanks per 2 wells and are controlled compared to no tank control.
- 360 drill rigs (204 oil wells and 156 gas wells) drilled with Tier 4 engines compared to all drilled with Tier 2 engines
- 2,500 well-site dehydrators controlled 95 percent at gas well sites compared to no control at the well site. Dehydrators at compressor stations are controlled with or without ACEPMs.
- 950 low producing wells (2 barrels per day) converted to shut down compared to allowing low producing wells to continue operations.

TABLE 4.2.1.1.1-3
PROPOSED ACTION ANNUAL DEVELOPMENT EMISSION INCREASES IN THE MBPA

Calendar Year	Cumulative Net Change in NO_x from December 31, 2011 (tpy)	Cumulative Net Change in VOC from December 31, 2011 (tpy)	Cumulative Net Change in NO_x plus VOC from December 31, 2011 (tpy) (2+3)	Cumulative Number of Oil Wells Added	Cumulative Number of Gas Wells Added	Cumulative Wells Shut In or Converted to Water Injection	Cumulative Net Change in Number of Oil and Gas Producing Wells from December 31, 2011 (5+6-7)
2012	-53	25	-28	187	0	200	-13
2013	-172	-603	-775	363	0	400	-37
2014	-311	-684	-995	559	0	600	-41
2015	-387	-545	-932	794	0	800	-6
2016	-320	-99	-415	1,038	0	950	88
2017	-149	580	431	1,281	0	950	331
2018	-16	1,383	1,367	1,524	0	950	574
2019	194	2,213	2,407	1,767	12	950	829
2020	378	3,086	3,464	2,010	24	950	1,084
2021	561	3,959	4,520	2,253	36	950	1,339
2022	745	4,833	5,578	2,496	48	950	1,594

4.2.1.1.2 Potential Near-Field Criteria Pollutant Impacts Other than Ozone

To assess the potential air quality impact of the emissions associated with the Proposed Action, EPA-recommended dispersion models were used with meteorological data from Vernal, Utah, as described in Section 5 of the AQTSD. The criteria pollutant impacts were evaluated using a near-field model, AERMOD, and compared to ambient air quality standards. The criteria pollutants evaluated were PM_{10}, $PM_{2.5}$, NO_2, SO_2 and CO. The highest possibility of PM_{10} and $PM_{2.5}$ emissions takes place during the construction and development phase of the project. The highest possibility of NOx, CO, and SO_2 emissions takes place during the operations and infrastructure phases of the project. Each pollutant was modeled under the maximum development and operational scenarios of the Proposed Action, as discussed in the AQTSD (see **Appendix B**), which includes drilling during the maximum operation year (emissions shown in **Table 4.2.1.1.2-1**).

Tables 4.2.1.1.2-1 and **4.2.1.1.2-2** present the maximum modeled impact of Alternative A added to the pre-project background concentrations presented in **Table 3.2.3.2-1**, and the sum is compared to the applicable NAAQS. The results shown in **Tables 4.2.1.1.2-1** and **4.2.1.1.2-2** are from the oil well modeling scenario, because that scenario had greater impacts than the gas well modeling scenario except for 1-hour CO, which is from the gas well modeling scenario. **Section 4.2.1.1.1** describes the emission sources that contribute to the impacts shown in the tables. None of the modeled impacts for Alternative A exceed the NAAQS.

TABLE 4.2.1.1.2-1
ALTERNATIVE A MAXIMUM POTENTIAL CONSTRUCTION AND DEVELOPMENT IMPACTS

Pollutant	Averaging Period	Ambient Air Concentration ($\mu g/m^3$)					
		Year of Maximum Impact	Location of Maximum Impact	Modeled Impact	Background	Total	NAAQS
PM_{10}	24-hour	2007	100 m west of pad construction	72.5	18.7	91.2	150
$PM_{2.5}$	24-hour	NA	200 m SE of pad construction	14.3	19.7	34.0	35
	Annual	2005	100 m east of producing wells	1.4	6.6	8.0	12

TABLE 4.2.1.1.2-2
ALTERNATIVE A MAXIMUM POTENTIAL OPERATIONS IMPACTS

Pollutant	Averaging Period	Ambient Air Concentration ($\mu g/m^3$)					
		Year of Maximum Impact	Location of Maximum Impact	Modeled Impact	Background	Total	NAAQS
CO	1-hour	2007	100 m north of compressor station	276	2,641	2,917	40,000
	8-hour	2009	100 m east of GOSP	137	1,657	1,794	10,000

Pollutant	Averaging Period	Ambient Air Concentration (µg/m³)					
		Year of Maximum Impact	Location of Maximum Impact	Modeled Impact	Background	Total	NAAQS
NO_2	1-hour	NA	100 m east of producing wells	106.9 [a]	65.7	172.6	188
	Annual	2005	100 m east of producing wells	16.5	8.8	25.3	100
SO_2	1-hour	NA	100 m east of GOSP	0.7	20.1	20.8	196
	3-hour	2006	100 m south of GOSP	0.6	14.3	14.9	1,300

m – meters. µg/m3 – micrograms per cubic meter

[a] Assumes Tier 2 NO to NO_2 conversion of 80 percent

4.2.1.1.3 Potential Hazardous Air Pollutant Impacts

The potential impact of emissions from acrolein, benzene, and formaldehyde were modeled. These three HAPs were selected due to their relatively high emission rates and relatively low RELs, (RfCs), and TSLs, as discussed in **Section 3.2.2.3**. For non-carcinogenic effects, the modeled impacts for Alternative A were compared to the RELs, RfCs, and TSLs, as shown in **Table 4.2.1.1.3-1** for operational impacts. HAP impacts were not modeled for the construction and development phase of the project, because the emissions are much smaller than during the operations phase. None of the impacts are greater than the evaluation criteria. The modeled impacts shown in **Table 4.2.1.1.3-1** are the maximum impact from either the oil well modeling scenario or the gas well scenario, depending on which impact is greater.

TABLE 4.2.1.1.3-1
ALTERNATIVE A OPERATIONS HAPS IMPACTS AND DEVELOPMENT PHASE

Pollutant and Averaging Time	Averaging Period	Maximum Impact Year	Modeled Maximum Impact (µg/m³)	Relative Exposure Levels (µg/m3)	Reference Concentrations (µg/m3)	Toxic Screening Levels (µg/m³)
Acrolein	Annual	2006	0.18	NA [a]	0.35	NA
	1-hour	2006	1.50	2.5	NA	23
Benzene	Annual	2005	0.30	NA	30	NA
	1-hour	2005	5.55	1,300	NA	18 [b]
Formaldehyde	Annual	2006	1.27	NA	9.8	NA
	1-hour	2007	12.32	55	NA	37

µg/m3 – micrograms per cubic meter

[a] NA means that the criterion is not applicable for the averaging time noted, i.e., there is no value.

[b] The TSL for benzene is a 24-hour average, but the 1-hour concentration is conservatively compared to the TSL.

Potential carcinogenic effects are evaluated by calculating the probability of contracting cancer due to continuous exposure to carcinogenic HAPs. The carcinogenic HAPs of interest are formaldehyde and benzene. The results for Alternative A operational impacts are shown in **Table 4.2.1.1.3-2**. As discussed in the AQTSD, cancer risk is calculated for both the Maximum Likely Exposure (MLE) and the Maximum Exposed Individual (MEI). The MLE risk value is a more realistic, yet a very conservative over-estimate of, potential cancer risk than the MEI risk value. MLE exposure is based on a 9-year exposure, which is the average duration that a person resides at a single location. MEI is based on continuous exposure for the LOP. The MEI and MLE adjustment factors are further described in the AQTSD. Potential cancer risk is not calculated for construction and development impacts, since the potential emissions of carcinogenic HAPs are much less than for operational impacts.

TABLE 4.2.1.1.3-2
ALTERNATIVE A OPERATIONAL POTENTIAL CARCINOGENIC RISK

Exposure Scenario	HAP	Unit Risk Factor ($1/\mu g/m^3$)	Exposure Adjustment Factor	Modeled Annual Impact ($\mu g/m^3$)	Cancer Risk
MLE	Benzene	2.2×10^{-06} to 7.8×10^{-06}	0.095	0.30	6.2×10^{-08} to 2.2×10^{-07}
	Formaldehyde	1.3×10^{-05}	0.095	1.27	1.6×10^{-06}
				Total MLE Risk	**1.8×10^{-06}**
MEI	Benzene	2.2×10^{-06} to 7.8×10^{-06}	0.571	0.30	3.8×10^{-07} to 1.3×10^{-06}
	Formaldehyde	1.3×10^{-05}	0.571	1.27	9.4×10^{-06}
				Total MEI Risk	**1.1×10^{-05}**

µg/m3 – micrograms per cubic meter

The maximum likely exposure impact reported in **Table 4.2.1.1.3-2** is a potential carcinogenic risk of 1.8 in a million. This value is an over-estimate and not likely to occur, as it assumes that a person is exposed outside continuously for 9 years at a location immediately adjacent to a worst-case set of emitting devices operating continuously at maximum production. Therefore, the potential risk is less than the acceptable range of risk published by the EPA of 1 to 100 in a million (USEPA 1993).

4.2.1.1.4 Potential Far-Field Visual Air Quality and Air Quality Related Value Impacts

Potential impacts of the Proposed Action on Prevention of Significant Deterioration (PSD) increments, visual air quality, and air quality related values (AQRV) were assessed with the far-field model CALPUFF. Visual air quality and acid deposition were assessed at 13 Class I areas and 9 sensitive Class II areas. In addition, potential changes to acid neutralization capacity (ANC) at 21 sensitive lakes located in western Colorado were assessed. The Class I areas, sensitive Class II areas, and sensitive lakes evaluated are shown in the AQTSD. Generally, potential impacts on AQRVs are of concern only when examining cumulative impacts of the Proposed Action plus other activities in the region. PSD increments were established by the Federal Clean Air Act to prevent significant deterioration of air quality, especially in areas such as National Parks and Wilderness Areas. If the potential impact of an operation in an area is less than the PSD increments, then, according to the Federal Clean Air Act, significant deterioration of the air quality in that region will not occur with respect to the averaging times and pollutants for which PSD increments have been established. However, impacts with respect to PSD increments are a regulatory process, and thus comparison to increments is provided herein as a point of information only. Nevertheless, the potential impacts of the Proposed Action alone were evaluated as reported in the AQTSD.

Potential impacts with respect to PSD increments at the Class I and sensitive Class II areas are shown for the five closest Class I and sensitive Class II areas to the MBPA in **Table 4.2.1.1.4-1**. The potential impacts of the project are much less than the PSD increments. The 0.5 and 1.0 deciview (dV) change analysis thresholds were exceeded at the closest sensitive Class II area. There was one day at the nearest Class I area where the maximum dV change was greater than 1.0, but the 98th percentile was less than 1.0. Note that the modeled impacts are for full production of the entire project plus maximum drilling frequency. This scenario would not likely occur. In addition, the ACEPMs discussed in **Section 2.2.12** and the adaptive management strategy to mitigate potential ozone formation discussed in **Section 2.2.11** would reduce the potential regional haze impacts because those measures would reduce NOx and VOC emissions specifically and likely reduce other pollutants as well.

TABLE 4.2.1.1.4-1
ALTERNATIVE A MAXIMUM IMPACTS AT
CLOSEST CLASS I AND SENSITIVE CLASS II AREAS COMPARED TO PSD INCREMENTS

Class I and Sensitive Class II Areas	NO_2 Annual ($\mu g/m^3$)	PM_{10} Annual ($\mu g/m^3$)	PM_{10} 24-hr ($\mu g/m^3$)	$PM_{2.5}$ Annual ($\mu g/m^3$)	$PM_{2.5}$ 24-hr ($\mu g/m^3$)	SO_2 3-hr ($\mu g/m^3$)	SO_2 24-hr ($\mu g/m^3$)	SO_2 Annual ($\mu g/m^3$)
PSD Class I Increments	**2.5**	**4**	**8**	**2**	**1**	**25**	**5**	**2**
NPS Class I Areas								
Arches National Park	0.0016	0.022	0.513	0.0047	0.110	0.005	0.0008	0.00003
NPS Class II Areas								
Dinosaur National Monument	0.0491	0.2334	4.55	0.0496	0.966	0.1053	0.0135	0.0005
U.S. Forest Service (USFS) Class II Areas								
Flaming Gorge National Recreation Area	0.0029	0.067	0.549	0.0142	0.117	0.011	0.0014	0.00011
High Uintas Wilderness Area	0.0058	0.0913	0.779	0.0194	0.1655	0.021	0.0028	0.00016
USFWS Class II Areas								
Browns Park National Wildlife Refuge	0.0046	0.0614	0.583	0.0130	0.1236	0.0130	0.0017	0.00011
PSD Class II Increments	**25**	**17**	**30**	**9**	**4**	**512**	**91**	**20**

µg/m3 – micrograms per cubic meter

Potential visual air quality impacts were assessed by comparing changes in regional haze calculated with both the CALPUFF post processor Method 8 and the revised IMPROVE equation for calculating light extinction (FLAG 2010). Method 8 and the revised IMPROVE equations for evaluating regional haze impacts have not been previously used in Environmental Impact Statements for oil and gas projects in Utah and thus the results using Method 8 cannot be compared to previous Impact Statements. The new method separately evaluates small and large particles and uses different relative extinction values for the various species of particles that could affect light extinction than used in previous methods. This method was chosen because the Federal Land Managers recently suggested its use over previous methods. The change in light extinction, in terms of dV, was compared to the 0.5-dV and 1.0-dV change levels of concern thresholds promulgated by the Federal Land Managers. In addition, the 98th percentile (8th-high) maximum change in light extinction was calculated and reported. The visual air quality impacts for all of the Class I and sensitive Class II areas were evaluated, with the five closest areas shown in **Table 4.2.1.1.4-2.**

TABLE 4.2.1.1.4-2
ALTERNATIVE A REGIONAL HAZE IMPACTS
AT CLOSEST CLASS I AND SENSITIVE CLASS II AREAS

Class I and Sensitive Class II Areas	Number of Days > 0.5 dV Change	Number of Days >1.0 dV Change	Max Change in b_{ext} (dV)	Eighth-High Change in b_{ext} (dV)
NPS Class I Areas				
Arches National Park	17	1	2.01	0.75
NPS Class II Areas				
Dinosaur National Monument	131	89	8.12	3.20
USFS Class II Areas				
Flaming Gorge National Recreation Area	64	27	2.22	1.60
High Uintas Wilderness Area	85	52	3.32	2.22
USFWS Class II Areas				
Browns Park National Wildlife Refuge	63	16	1.73	1.11

dV – deciview

Acid deposition at the Class I and sensitive Class II areas were compared to both the Deposition Analysis Thresholds (DATs) of 0.005 kilograms per hectare per year (kg/ha-yr) sulfur or nitrogen deposition and the impact thresholds of 3 and 5 kg/ha-yr for sulfur and nitrogen deposition, respectively. The DATs are not an impact threshold, but rather represent estimated naturally occurring deposition prior to any anthropogenic influences. The DATs are levels below which estimated impacts from a proposed new or modified source are considered negligible. In cases where a source's impact equals or exceeds the DAT, the NPS/USFWS will make a project specific assessment of whether the projected increase in deposition would likely result in an "adverse impact" on resources, considering existing AQRV conditions, the magnitude of the expected increase, and other factors. The results for the five closest areas evaluated are shown in **Table 4.2.1.1.4-3.** None of the impacts exceed the 3 and 5 kg/ha-yr impact thresholds. The DAT was exceeded at the closest Class I and Class II areas for nitrogen deposition, but not for sulfur deposition. Implementation of the ACEPMs (**Section 2.2.12**) and the Adaptive Management Strategy to mitigate potential ozone formation (**Section 2.2.11**) would also reduce the potential deposition of nitrogen.

TABLE 4.2.1.1.4-3
ALTERNATIVE A ACID DEPOSITION IMPACTS
AT CLOSEST CLASS I AND SENSITIVE CLASS II AREAS

Class I and Sensitive Class II Areas	Nitrogen Deposition (kg/ha-yr*)	Sulfur Deposition (kg/ha-yr)
NPS Class I Areas		
Arches National Park	0.0028	0.00002
NPS Class II Areas		
Dinosaur National Monument	0.0279	0.00020
USFS Class II Areas		
Flaming Gorge National Recreation Area	0.0147	0.00008
High Uintas Wilderness Area	0.0150	0.00007
USFWS Class II Areas		
Browns Park National Wildlife Refuge	0.0092	0.00006

*kg/ha-yr - kilograms per hectare per year

In addition to analyzing potential acid deposition impacts at the Class I and II areas of interest, the potential for the Proposed Action to cause a change in ANC at 21 sensitive lakes was evaluated. The results are shown in the AQTSD. The potential for ANC change resulting from emissions associated with Alternative A was less than the evaluation thresholds of a 10 percent or 1 micro equivalent per liter change at all of the lakes evaluated. The greatest potential change in ANC was 1.35 percent, at Upper Ned Wilson Lake.

4.2.1.1.5 Potential Ozone Impacts

The BLM has recently developed a Uinta Basin specific photochemical modeling platform as part of its air resource management strategy (ARMS) for the Uinta Basin. The ARMS modeling platform will replace CALPUFF modeling for far-field project-specific and cumulative impact analyses. The ARMS platform will also become the standard photochemical modeling system for assessing project-specific and cumulative impacts on both near and far-field ozone concentrations. The ARMS modeling platform was not yet available at the time of the draft EIS development and thus no project-specific photochemical modeling was performed for the Proposed Action and Alternatives at that time. Accordingly, results from the Greater Natural Buttes (GNB) Final Environmental Impact Statement (FEIS) (BLM 2012a) were incorporated to evaluate potential impacts from the Proposed Action and alternatives and is discussed below. However, since the draft EIS, the ARMS platform became available and project specific ARMS modeling was conducted, with the results summarized below.

A cumulative and project specific ozone impact assessment was conducted as part of the GNB FEIS (BLM 2012a). The GNB cumulative and ozone impact assessment evaluated the impacts of not only the proposed GNB project, but also the impacts of reasonably foreseeable development (RFD) in the Uinta Basin. The RFD impacts analyzed in the GNB FEIS explicitly included the Newfield Monument Butte project. Accordingly, until the ARMS modeling platform became available, reviewing and incorporating the GNB analysis was the most appropriate method to evaluate potential ozone impacts and cumulative impacts of the Proposed Action and alternatives.

Potential ozone impacts are evaluated by comparing maximum potential ozone concentrations to the NAAQS and by determining the maximum incremental increase of ozone concentrations. The GNB FEIS analysis showed that cumulative emissions of all projects would not cause an exceedance of the NAAQS at any location in the modeling domain (the eastern two-thirds of Utah and all of Colorado west of the Front Range). The GNB FEIS showed that the proposed GNB project (3,675 wells) could cause an increase in ozone concentrations of 0.2 parts per billion (ppb) over much of Uintah County and into Colorado. The fourth-high maximum increase due to the proposed GNB project alone was 2.4 ppb. The contribution of emissions to potential ozone formation is not linear with respect to emissions. Therefore, the Proposed Action of 5,750 wells should have approximately the same impact on ozone as the GNB project, due to the fact that the GNB and the proposed Project are located in the same region, are subject to the same meteorological conditions, use similar drilling and operational techniques, and have similar total emissions of ozone precursors. The non-linearity of potential ozone impacts with respect to emissions was demonstrated in the GNB FEIS. Potential ozone precursor emissions (NO_x plus VOC) for the GNB proposed project alone were 8,830 tons per year (tpy). GNB also analyzed the potential ozone impacts of an alternative action, the Optimal Recovery Alternative, with ozone precursor emissions of 29,922 tpy. The fourth-high maximum potential ozone increase under the Optimal Recovery Alternative was 4.9 ppb, even though the emissions evaluated were a factor of 3.4 greater than the GNB proposed project. Even though the Proposed Action contains more wells and potentially greater emissions than the GNB project (Proposed Action ozone precursor emissions of 16,051 tpy as indicated in **Table 4.2.1.1.1-1**), the emissions from each of these projects are a relatively small percentage of the total emissions of ozone precursors in the region (less than 5 to 10 percent). This, and the fact that a potential increase in ozone is not linear with respect to emissions, indicates that the Proposed Action and GNB would have approximately the same potential ozone impact.

The GNB FEIS ozone impact assessment used the current “state of the art” photochemical models. These models have been demonstrated reasonable for traditional ozone formation, which occurs during the summer when photochemical reactions in the atmosphere are the largest. However, as discussed in Chapter 3, ozone concentrations exceeding the NAAQS have been observed during the winter months in the Uinta Basin. However, as stated above, the ARMS platform which utilizes the Community Multiscale Air Quality model (CMAQ), is a newer photochemical model platform than that used in the GNB FEIS.

The project specific ARMS modeling addressed ozone impacts from the Proposed Action. The Proposed Action emissions were input into the model as the emissions from the Proposed Action were the highest of all the alternatives. Two different project specific scenarios were modeled using the ARMs platform for ozone: max emissions and post drilling. Because NO_x and VOCs are both ozone precursors and NO_x emissions will likely peak during drilling and completion activities while VOCs will likely peak during full production, the two scenarios were completed to capture both emission peaks. Additionally, because EPA guidance is available to assess ozone photochemical models in a relative sense, the project specific modeling report addresses the ozone impacts in both an absolute and relative manner.

The ARMS platform contains a 4 km, 12 km and a 36 km grid; however, the project specific modeling only used the 4 km grid as the MBPA is fully contained within the 4 km grid. The 4 km grid contained receptors at multiple air quality stations within the Uinta Basin as well as receptors at surrounding Class 1 and Class 2 areas and other monitored locations. The full list of receptors is contained in Appendix K of this EIS.

The project specific ARMS model used a modified version of the full ARMS model for the baseline analysis. Because the Monument Butte estimated emissions used in the full ARMS model were not the same as the Proposed Action emissions contained within this EIS, the project specific ARMS model was adjusted to create the new baseline model. The baseline model contains emissions from other sources in the modeling domain.

The project specific ARMS modeling was completed for calendar year 2010. The ozone standard is for a three year average of the fourth-high 8-hour daily maximum value however, so the model predicted values would not necessarily mean a violation of the standard as the modeling is based on one year of data. The peak project specific ozone impact (fourth-highest 8-hour daily maximum) for the absolute modeling results is 1.6 ppb at the Dinosaur AQS station with impacts at all Class 1 areas at 0.1 ppb or less (Appendix K, Table 3-6). The Dinosaur AQS station is located within the Uinta Basin Study Area. While the Proposed Action ozone impact is much less than the NAAQS of 75 ppb (0.075 ppm), the baseline plus Proposed Action does show exceedances of the NAAQS in the Uinta Basin Study Area and the Uintah and Ouray Indian Reservation with values of 88.5 ppb and 83.2 ppb respectively (Appendix K, Table 3-6).

The relative model results were adjusted using the EPA's Model Attainment Test Software tool to minimize model uncertainty. The relative results were completed for a set of ozone monitor locations and also for unmonitored locations. Using this technique for the monitored locations, the maximum project specific impact occurs at a location at the Fruitland monitor (49-013-1001) with a value of 1.5 ppb, which is located outside the Uinta Basin Study Area. The highest ozone impact at a monitored location within the Uinta Basin Study Area occurs at Dinosaur National Monument (49-047-1002) with a value of 1.4 ppb (Appendix K, Table 3-10). The maximum monitor locations that show exceedances of the NAAQS with the baseline plus Proposed Action are the Ouray Site (49-047-2003) with a value of 78.7 ppb, and two locations outside the Uinta Basin Study Area. The two locations outside the study area show no impact from the Proposed Action however (Appendix K, Table 3-10). The maximum project specific relative result at the unmonitored locations occurs in the Uintah and Ouray Indian Reservation with a value of 1.4 ppb (Appendix K, Table 3-11). Lastly, two locations, Uinta Basin Study Area and the Uintah and Ouray Indian Reservation, are two unmonitored locations that show exceedances of the NAAQS with the Proposed Action and baseline.

Note that at the locations that show exceedances of the ozone NAAQS with the Proposed Action plus baseline, the Proposed Action contributes at most 2% of the total impact. The full results and modeling description is contained in the modeling report in Appendix K of this EIS.

4.2.1.1.6 Adaptive Management Strategy to Mitigate Potential Ozone Formation

The comparison of the No Action emissions to the Proposed Action emissions indicates that for the first several years of the project, emissions associated with the No Action Alternative would be greater than any of the Action Alternatives (A, C, or D). However, emissions for any of the Action Alternatives would eventually exceed the No Action emissions. Therefore, an Adaptive Management Strategy to mitigate the potential for adverse ozone formation would be implemented under the Proposed Action, Alternative C, and Alternative D. The Adaptive Management Strategy is described in **Section 2.2.11**.

4.2.1.1.7 Potential Greenhouse Gas Emission Impacts

The assessment of GHG emissions and climate change remains in its earliest stages of formulation. Applicable EPA rules do not require any controls and have yet to establish any emission limits related to GHG emissions or impacts. The lack of scientific models that predict climate change on a regional or local level prohibits the project-specific quantification of potential future impacts on climate change. Potential GHG impacts are global and cumulative in nature only and are discussed in Chapter 5. GHG emissions for the Proposed Action at full project development are shown in **Table 4.2.1.1.1-1.**

4.2.1.2 Alternative B – No Action Alternative

4.2.1.2.1 Emissions

Under the No Action Alternative, oil and gas development and production in the MBPA would continue to occur on state, private, and federal lands or minerals. As discussed in **Section 2.4**, a net total increase (net of new wells drilled minus wells converted or shut-in) of 788 wells (579 oil wells and 209 gas wells) could be drilled (up to 360 wells per year) and placed into production in the MBPA under the No Action Alternative. Emissions for the No Action Alternative are shown in **Table 4.2.1.2.1-1**, and the details for the emission calculation are provided in the AQTSD.

TABLE 4.2.1.2.1-1
NO ACTION ALTERNATIVE EMISSIONS

Pollutant	Well Development (tpy*)	Well Production (tpy)	Infrastructure (tpy)	Total Project Emissions (tpy)
Criteria Pollutants				
NO_x	931.2	661.4	224.7	1,817.3
CO	498.7	558.1	440.5	1,497.4
VOC	178.1	1,707.2	231.6	2,116.9
SO_2	1.0	1.3	0.5	2.8
PM_{10}	598.7	169.6	41.8	810.1
$PM_{2.5}$	89.6	53.4	13.9	157.0
HAPs				
Benzene	0.43	11.16	2.17	13.75
Toluene	0.16	26.29	1.60	28.04
Xylene	0.10	42.79	0.37	43.26
Formaldehyde	0.043	32.89	16.87	49.80
Acrolein	0.0043	4.62	1.70	6.33
Total HAPs	0.98	196.07	30.55	227.61
GHGs				
CO_2	94,746	249,841	117,217	461,805
CH_4	27.21	1,503	156	1,686
N_2O	0.76	0.47	0.22	1.45
GWP	95,553	281,549	120,563	497,665

*tpy – tons per year

The emissions shown for the No Action Alternative do not include the benefit of the ACEPMs that Newfield would implement associated with the Proposed Action. However, the estimates do include the benefit of the Oil and Gas NSPS, because that regulation is applicable to future development. One of the main benefits of the NSPS is control on storage tanks with the potential to emit greater than 6 tpy. If none of the ACEPMs discussed under the Proposed Action are implemented, the storage tanks in the MBPA would have emissions less than the 6 tpy threshold, and no controls would be applied. As in the case of the Proposed Action, the emission estimates for the No Action Alternative do not include benefits from future SIP, FIP, and NSR programs that may be implemented in the region in the near future. The emission estimates also do not include possible emission reductions from the Adaptive Management Strategy to mitigate potential ozone formation, because the Strategy would not be implemented under the No Action Alternative.

Comparison of emission estimates in **Table 4.2.1.2.1-1** to the annual development emissions for the Proposed Action shown in **Table 4.2.1.1.1-3** shows that the No Action Alternative emissions are greater than for the Proposed Action for the first few years of the project. Development of the Proposed Action can continue into approximately early calendar year 2021 for total ozone precursor (NOx plus VOC) emissions, late 2019 for VOC emissions alone, and beyond 2022 for NOx emissions alone without causing an increase greater than the No Action Alternative.

4.2.1.2.2 Potential Near-Field and HAP Impacts

Potential near-field impacts are a function of isolated local activities, not total emissions or field-wide activities. Accordingly, although there would be fewer total wells and activities in the region under the No Action Alternative, the near-field impact with respect to criteria pollutant impacts from construction and development of wells would be the same under Alternative B as those for Alternative A. The maximum near-field impacts of emissions with respect to operational activities from Alternatives B and A on criteria pollutants other than ozone and HAPs are expected to be approximately the same. However, it is possible that near-field impacts under Alternative B would be greater than those for Alternative A, because not all of the ACEPMs for Alternative A would be implemented under the No Action Alternative. Other than the ACEPMs, the individual well site and activities of both Alternatives are essentially the same, and the infrastructure activities under Alternative B are typically less than those for Alternative A.

4.2.1.2.3 Potential Far-Field Visual Air Quality and Air Quality Related Value Impacts

Since the emissions under Alternative B are less than those for Alternative A, the overall visual air quality and AQRV impact would also be the same or less than those for Alternative A.

4.2.1.2.4 Potential Ozone Impacts

For the first few years of the project, ozone precursor emissions under the No Action Alternative would be greater than those for the Proposed Action. Thus, the potential ozone impacts may also be slightly greater if regional oil and gas emissions are a major contributor to local ozone formation, as is suspected. On the other hand, eventually the Proposed Action emissions would exceed No Action Alternative emissions, and at that time, the potential ozone impact of the No Action Alternative may be less than that for the Proposed Action. However, ozone formation is not linear with respect to emissions, and thus the magnitude of the difference is not quantifiable. **Table 6-1** of Appendix B shows the comparison between specific emission values for ozone precursors between the annual Proposed Action development and the No Action Alternative.

4.2.1.2.5 Potential Greenhouse Gas Emission Impacts

The greenhouse gas emissions shown in **Table 4.2.1.2.1-1** for Alternative B are less than those for Alternative A, as shown in **Table 4.2.1.1.1-1**. Therefore, the potential impact on climate change would also be less. However, the magnitude of such a difference is not quantifiable and is likely to be *de minimis* because the GHG emissions of both alternatives are small with respect to total emissions on a state, national, or global basis.

4.2.1.3 Alternative C – Field-Wide Electrification

4.2.1.3.1 Emissions

Under Alternative C, Newfield would replace fossil-fueled stationary engines (pumpjack engines, compressor engines, and on-site electrical generators) with electric motors. The electrical energy to supply those motors would come from either Newfield-constructed substations and electrical generators (total of 550 MWe of power) or from commercial electrical energy. **Table 4.2.1.3.1-1** shows the emissions that could occur under Alternative C when the entire project is developed and all of the electrical energy is provided by electrical generators built by Newfield.

It is possible that, rather than Newfield providing the electrical energy, commercial electrical power could be obtained and used for a portion or all of the MBPA. If all of the required electrical energy were obtained from commercial sources, the ultimate development emissions for Alternative C would decrease to the values shown in **Table 4.2.1.3.1-2.**

4.2.1.3.2 Potential Near-Field and HAP Impacts

Under Alternative C there would be lower total emissions than those for Alternative A, even though there would be the same number of oil and gas wells and oil and gas infrastructure for Alternative C as compared to those under Alternative A. There would be an overall reduction in emissions even when the emissions from the turbine generators are added. It is more efficient to have large turbine generators creating electricity than to have individual fossil-fueled field engines.

There is the same number of oil and gas wells in Alternative C as compared to Alternative A, and the well-site construction and development activities are the same in both alternatives. Because potential near-field impacts are a function of isolated local activities, not total emissions or field-wide activities, the potential ambient air quality impact of the construction and development activities for the oil and gas wells under Alternative C are the same as that for Alternative A. Alternative C includes construction of substations and transmission lines. This construction is similar to well pad, pipeline, and road construction under Alternative A, and maximum construction impacts are localized. Therefore, potential near-field impacts of construction would be essentially the same for Alternatives C and A.

Operational impacts of Alternative C when Newfield is providing the electrical energy with turbine generators would be less than those for Alternative A, since local well pad emissions decrease due to replacement of well-site engines with electric motors. Dispersion modeling discussed in the AQTSD demonstrated that the potential impact of the turbine generators is less than the other activities of Alternative A. If commercial electrical energy is used to supply all or part of the MBPA, the potential near-field impacts would be even less.

TABLE 4.2.1.3.1-1
MAXIMUM YEAR EMISSIONS UNDER ALTERNATIVE C (ON-SITE SUBSTATIONS AND ELECTRICAL GENERATORS)

Pollutant	Well Development (tpy)	Well Production (tpy)	Infra-structure (tpy)	Total Emissions (tpy)	Well Development (tpy)	Well Production (tpy)	Infra-structure (tpy)	Total Emissions (tpy)	Total Emissions (tpy)
Criteria Pollutants									
	Oil Wells				Gas Wells				Project Total
NO_x	129.6	344.6	250.1	724.3	668.6	511.1	90.8	1,270.5	1,994.8
CO	106.0	290.9	269.2	666.1	594.3	523.1	165.9	1,283.2	1,949.3
VOC	12.1	3,532.4	580.8	4,125.3	35.9	3,795.8	409.2	4,240.9	8,366.2
SO_2	0.2	2.0	2.0	4.1	1.2	2.9	1.2	5.3	9.4
PM_{10}	423.3	410.6	376.7	1,210.6	1,145.1	283.0	70.3	1,498.4	2,709.0
$PM_{2.5}$	46.0	64.4	79.1	189.6	128.4	61.8	42.4	232.7	422.3
HAPs									
	Oil Wells				Gas Wells				Project Total
Benzene	0.084	9.84	3.92	13.84	0.519	26.15	12.76	39.43	53.27
Toluene	0.031	8.83	3.91	12.78	0.188	48.84	10.63	59.66	72.44
Xylene	0.020	2.74	1.16	3.92	0.1290	37.30	2.44	39.86	43.78
Formal-dehyde	0.0080	0.25	4.21	4.47	0.0527	0.36	4.91	5.32	9.79
Acrolein	0.00080	---	0.037	0.038	0.00527	---	0.044	0.049	0.087
Total HAPs	0.26	183.91	41.53	225.69	1.05	211.21	42.23	254.48	480.17
GHGs									
	Oil Wells				Gas Wells				Project Total
CO_2	18,776	394,514	1,018,246	1,431,536	116,923	602,127	983,856	1,702,905	3,134,441
CH_4	18.81	3,809	665	4,492	4.60	7,152	933	8,090	12,582
N_2O	0.15	0.74	1.90	2.80	0.93	1.13	1.85	3.91	6.71
GWP	19,218	474,727	1,032,792	1,526,737	117,308	752,679	1,004,029	1,874,015	3,400,752

tpy – tons per year

TABLE 4.2.1.3.1-2
MAXIMUM YEAR EMISSIONS UNDER ALTERNATIVE C (OFF-SITE COMMERCIAL SOURCE OF ELECTRICAL ENERGY)

Pollutant	**Well Development** (tpy)	**Well Production** (tpy)	**Infra-structure** (tpy)	**Total Emissions** (tpy)	**Well Development** (tpy)	**Well Production** (tpy)	**Infra-structure** (tpy)	**Total Emissions** (tpy)	**Total Emissions** (tpy)
Criteria Pollutants									
	Oil Wells				Gas Wells				Project Total
NO_x	129.6	344.6	202.5	676.7	668.6	511.1	33.7	1,213.3	1,890.0
CO	106.0	290.9	225.8	622.6	594.3	523.1	113.7	1,231.1	1,853.7
VOC	12.1	3,532.4	564.2	4,108.7	35.9	3,795.8	389.4	4,221.1	8,329.8
SO_2	0.2	2.0	1.0	3.2	1.2	2.9	0.1	4.2	7.4
PM_{10}	423.3	410.6	344.8	1,178.7	1,145.1	283.0	32.1	1,460.2	2,638.9
$PM_{2.5}$	46.0	64.4	47.3	157.8	128.4	61.8	4.2	194.5	352.3
HAPs									
	Oil Wells				Gas Wells				Project Total
Benzene	0.084	9.84	3.85	13.77	0.519	26.15	12.68	39.35	53.12
Toluene	0.031	8.83	3.17	12.03	0.188	48.84	9.74	58.76	70.79
Xylene	0.020	2.74	0.79	3.55	0.1290	37.30	1.99	39.42	42.97
Formal-dehyde	0.0080	0.25	0.13	0.38	0.0527	0.36	0.01	0.43	0.81
Acrolein	0.00080	---	0.000	0.001	0.00527	---	0.000	0.005	0.006
Total HAPs	0.26	183.91	35.62	219.79	1.05	211.21	35.14	247.39	467.18
GHGs									
	Oil Wells				Gas Wells				Project Total
CO_2	18,776	394,514	242,780	656,070	116,923	602,127	53,296	772,345	1,428,415
CH_4	18.81	3,809	650	4,477	4.60	7,152	916	8,073	12,550
N_2O	0.15	0.74	0.44	1.33	0.93	1.13	0.09	2.16	3.49
GWP	19,218	474,727	256,565	750,510	117,308	752,679	72,556	942,543	1,693,053

tpy – tons per year

4.2.1.3.3 Potential Far-Field Visual Air Quality and Air Quality Related Value Impacts

Since the emissions are less under Alternative C than those for Alternative A, the overall visual air quality and AQRV impact would also be the same or less than those for Alternative A.

4.2.1.3.4 Potential Ozone Impacts

The annual emissions are less under Alternative C than those for Alternative A. In addition, the same regulations, emission reduction programs, ACEPMs, and Adaptive Management Strategy to mitigate potential ozone formation apply to both Alternative C and Alternative A. If the regional oil and gas emissions are a contributor to local ozone formation, as is suspected, then the potential impacts on ozone would be the same or less for Alternative C than those for Alternative A. However, ozone formation is not linear with respect to emissions, and thus the magnitude of the difference is not quantifiable.

4.2.1.3.5 Potential Greenhouse Gas Emission Impacts

The greenhouse gas emissions shown in **Tables 4.2.1.3.1-1** for the Alternative C case where Newfield provides all electrical energy through on-site generators are slightly greater than the greenhouse gas emissions for the Proposed Action, as shown in **Table 4.2.1.1.1-1**. Therefore, the potential impact on climate change for Alternative C would be slightly greater or the same as Alternative A. For the case where electrical energy is provided from off-site commercial sources, the potential greenhouse gas emissions shown in **Table 4.2.1.3.1-2** for Alternative C would be less than those for Alternative A, as shown in **Table 4.2.1.1.1-1**. Therefore, the potential impact on climate change would also be less in this case. However, the magnitude of any differences in potential climate change impact is not quantifiable and is likely to be *de minimis*, because the GHG emissions are small with respect to total emissions on a state, national, or global basis.

4.2.1.4 Alternative D – Agency Preferred Alternative

4.2.1.4.1 Emissions

For analysis purposes, it is assumed that the same amount of wells would be drilled and operating under Alternative D as compared to the Proposed Action. However, surface disturbance would be substantially reduced, given Alternative D's enhanced use of existing well pads and multi-well pads. The oil and gas operations at the well sites under Alternative D would be similar to Alternative A, and supporting infrastructure for Alternative D would be the same as that for Alternative A. Emissions under Alternative D are shown in **Table 4.2.1.4.1-1.**

4.2.1.4.2 Potential Near-Field and HAP Impacts

Potential near-field impacts are a function of isolated local activities, not total emissions or field-wide activities. Accordingly, the near-field impact with respect to criteria pollutant impacts from construction and development of wells would be the same under Alternative D as that under Alternative A. Likewise, the operational impacts of Alternative D would be the same as those under Alternative A for criteria pollutants (other than ozone) and for HAPs, because the maximum impacts would be from local individual well operations or individual infrastructure facilities.

TABLE 4.2.1.4.1-1
MAXIMUM YEAR EMISSIONS UNDER ALTERNATIVE D

Pollutant	Well Development (tpy)	Well Production (tpy)	Infra-structure (tpy)	Total Emissions (tpy)	Well Development (tpy)	Well Production (tpy)	Infra-structure (tpy)	Total Emissions (tpy)	Total Emissions (tpy)
Criteria Pollutants									
	Oil Wells				Gas Wells				Project Total
NO_x	140.0	1,765.7	981.0	2,886.7	647.4	511.1	1,590.2	2,748.7	5,635.4
CO	109.3	2,266.8	1,782.8	4,158.8	586.3	523.1	3,226.8	4,336.2	8,495.0
VOC	13.0	2,321.5	1,109.2	3,443.7	34.1	3,795.8	1,479.0	5,308.8	8,752.6
SO_2	0.2	3.6	2.8	6.7	1.2	2.9	3.4	7.5	14.2
PM_{10}	429.7	566.7	393.2	1,389.7	1,117.0	283.0	88.8	1,488.8	2,878.5
$PM_{2.5}$	48.1	220.5	95.6	364.3	122.7	61.8	60.9	245.5	609.8
HAPs									
	Oil Wells				Gas Wells				Project Total
Benzene	0.084	11.15	5.61	16.84	0.52	26.15	13.95	40.62	57.46
Toluene	0.031	7.30	3.93	11.26	0.19	48.84	10.89	59.92	71.18
Xylene	0.020	2.12	1.08	3.22	0.13	37.30	2.51	39.94	43.16
Formal-dehyde	0.0080	182.65	49.38	232.03	0.053	0.36	148.50	148.92	380.95
Acrolein	0.00080	25.71	5.40	31.12	0.0053	---	14.47	14.48	45.60
Total HAPs	0.26	353.99	107.16	461.42	1.05	211.21	238.28	450.54	911.96
GHGs									
	Oil Wells				Gas Wells				Project Total
CO_2	18,986	730,353	597,890	1,347,228	116,376	602,127	714,145	1,432,648	2,779,876
CH_4	18.81	3,447	668	4,133	4.59	7,152	928	8,085	12,218
N_2O	0.154	1.37	1.11	2.63	0.930	1.13	1.34	3.40	6.03
GWP	19428	803,161	612,256	1,434,846	116,760	752,679	734,054	1,603,493	3,038,339

tpy – tons per year

4.2.1.4.3 Potential Far-Field Visual Air Quality and Air Quality Related Value Impacts

Since the emissions would less under Alternative D than those for Alternative A, the overall visual air quality and AQRV impact would be the same or less than those for Alternative A.

4.2.1.4.4 Potential Ozone Impacts

Annual emissions would be less under Alternative D than those under Alternative A. Furthermore, the same regulations, emission reduction programs, ACEPMs, and Adaptive Management Strategy to mitigate potential ozone formation apply to both Alternative D and Alternative A. If the regional oil and gas emissions are a contributor to local ozone formation, then the potential impacts on ozone would be the same or less under Alternative D, as compared to those under Alternative A. However, ozone formation is not linear with respect to emissions, and thus the magnitude of the difference is not quantifiable.

4.2.1.4.5 Potential Greenhouse Gas Emission Impacts

The GHG emissions shown in **Table 4.2.1.4.1-1** under Alternative D would be less than those under Alternative A, as shown in **Table 4.2.1.1.1-1**. Therefore, the potential impact on climate change would also be less. However, the magnitude of such a difference is not quantifiable and is likely to be *de minimis*, because the GHG emissions are small with respect to total emissions on a state, national, or global basis.

4.2.2 Mitigation

Under Alternatives A, C, and D, air quality mitigation measures and implementation BMPs to reduce emissions and potential air quality impacts would be necessary. A list of ACEPMs with respect to air quality is presented in **Section 2.2.12.1**.

Additional mitigation measures that complement the ACEPMs would be required by Federal New Source Performance Standards (e.g., 40 CFR 60 Subpart OOOO); Utah state permitting guidance and requirements; SIP, FIP, and NSR programs that may be promulgated in the near future.

Under Alternatives A, B, C, and D, the air quality measures presented in **Section 2.2.14** could be applied to reduce emissions of ozone precursors. Some of these mitigations are also ACEPMs (**Section 2.2.12.1**), some are also Federal or Utah rules, while some are only presented in **Section 2.2.14.** The potential emission reductions that could be achieved by applying the mitigations presented only in **Section 2.2.14** are shown in **Table 4.2.2-1**.

TABLE 4.2.2-1
POTENTIAL EMISSION REDUCTIONS DUE TO MITIGATIONS

Mitigation From Section 2.2.14	Potential Reduction in VOC Emissions	Basis of Emission Calculation	Notes
Evaporation ponds	97.94 tons per year by not using evaporation ponds.	Based on current water production rates and produced water sample analysis.	Newfield currently recycles or injects their water.

Mitigation From Section 2.2.14	Potential Reduction in VOC Emissions	Basis of Emission Calculation	Notes
Consideration of non-gas driven pneumatics	Not quantifiable	N/A	Newfield will consider using technologies other than gas bleed when applicable.
Control on tanks	1,501 tons per year by increasing the number of new tanks to be controlled in State jurisdiction.	Currently new tanks are controlled per NSPS Quad O. If State jurisdiction tanks were controlled per UDAQ BACT, more tanks would be controlled by 95%.	Newfield will follow all applicable Federal and State Rule tank control requirements.
Three way separators	1.9 million tons per year by not venting produced gas or 95 thousand tons per year by not flaring produced gas.	Based on well counts from Alternative D and current oil and gas well production rates.	Newfield currently sends most of the produced gas to a sales line.
Plunger lift systems	7,925 tons per year	Based on data from USEPA 2006 and the gas well count in Alternative D.	Newfield would consider plunger lift systems where applicable on gas wells.
Inspection Program	4,741 tons per year	Based on data from the pilot LDAR program and well counts in Alternative D.	Newfield started a pilot Leak Detection and Repair (LDAR).

4.2.3 Unavoidable Adverse Impacts

An increase in emissions of criteria pollutants, HAPs, and GHGs as a result of the project would be expected for the LOP.

4.2.4 Irretrievable and Irreversible Commitments of Resources

There are no irretrievable or irreversible commitments of air quality resources, because reclamation and revegetation of surface disturbances would be accomplished when production at individual sites has ceased and emissions are no longer occurring from those sites. Air quality could be impacted in and around the MBPA for the LOP.

4.2.5 Relationship of Short-Term Uses to Long-Term Productivity

Construction of oil and gas facilities and infrastructure would provide a short-term mineral use that would result in temporary impacts to air quality. The impacts would persist throughout the LOP.

4.3 GEOLOGY AND MINERALS

4.3.1 Direct and Indirect Effects

4.3.1.1 Alternative A – Proposed Action

Potential impacts to geologic and mineral resources from the Proposed Action include changes to local physiography and topography; decreased slope stability; depletion of oil and natural gas resources; and interference with potential mining of Gilsonite, tar sands, oil shale, and other leasable, locatable, and salable minerals within the MBPA.

4.3.1.1.1 Physiography and Topography

Construction of well pads, pipelines, central facilities, access roads, and other project facilities would cause topographic changes, including square- or rectangular-shaped cuts and fills in the unconsolidated alluvial and colluvial deposits within the MBPA. These changes to the topographic character of the area would be minor but long-term. The primary impact of these topographic changes would be on visual resources. Visual resource impacts are described in **Section 4.14**.

4.3.1.1.2 Geologic Hazards

Surface-disturbing activities that create steep slopes, or that are located in areas of instability associated with naturally occurring inter-bedded resistant and erodible layers of exposed geologic formations, could promote geologic hazards such as landslides, slumps, and debris flows. The potential for increased landslides from the Proposed Action is considered to be minor, because none of the geologic units exposed in the area have a high potential for mass movements. As discussed in **Section 3.3.3**, landslide susceptibility within the MBPA is classified as low to very low. Some small slumps may occur in the cuts created for the new access roads, pipelines, compressor stations, and well pads. However, these slumps would be localized and would not affect any existing structures. Debris flows occur at the mouths of narrow side canyons within the MBPA, such as portions of Wells Draw and Gilsonite Draw. The Proposed Action is unlikely to have any appreciable effect on the frequency or magnitude of these flows.

4.3.1.1.3 Oil and Natural Gas

Potential impacts to oil and natural gas resources include the depletion of these resources due to active extraction. While the ultimate recovery of oil and natural gas from the MBPA at full development is unknown, it is estimated that the maximum development of the 5,750 wells under the Proposed Action would result in a potential recovery of more than 335 million barrels of oil (MMbo), 540,669 million cubic feet of natural gas, and 10,085 thousand barrels (Mbbl) of NGLs from the Green River Formation over the LOP. In addition, development of deep gas wells could yield an additional estimated 6.9 trillion cubic feet (Tcf) of natural gas (see **Table 4.3.1.1.3-1**). These oil and gas resources would be removed from the subsurface and no longer would be available for extraction.

TABLE 4.3.1.1.3-1
SUMMARY OF OIL AND NATURAL GAS RESOURCES EXTRACTED BY ALTERNATIVE

Resource	Alternative A (Proposed Action)	Alternative B (No Action)	Alternative C (Field-wide Electrification)	Alternative D (Agency Preferred Alternative)
Oil (MMbo)	335	64	335	335
Percentage of Total Reserves[1]	6.2 %	1.2 %	6.2 %	6.2 %
Natural Gas (Tcf)	7.4	1.2	7.4	7.4
Percentage of Total Reserves[2]	28.5 %	4.6 %	28.5 %	28.5 %
Natural Gas Liquids (Mbbl)	10,085	1,662	10,085	10,085
Percentage of Total Reserves	Unknown	Unknown	Unknown	Unknown
Total Number of Wells	5,750	788	5,750	5,750

[1]Assumes 5,400 MMbo reserves are present within the Uinta Basin (Newfield 2012).
[2]Assumes up to 26 Tcf of natural gas reserves are available within the Uinta Basin (USGS 2002).

Newfield has estimated that there is currently some 5,400 MMbo reserves present within the Uinta Basin (Newfield 2012). The maximum development of the 5,750 wells under the Proposed Action would result in a potential recovery of more than 335 MMbo over the LOP, decreasing the presumed total available oil reserves in the Uinta Basin by approximately 6.2 percent. In addition, the USGS estimates there is up to 26 Tcf of natural gas reserves in the Uinta Basin (USGS 2002). While the National Research Council of the National Academies acknowledges a large amount of uncertainty associated with this estimate, it is assumed that this total is likely an underestimate of the total amount of natural gas reserves present in the Uinta Basin, for purposes of analysis in this EIS. In any case, implementation of the Proposed Action would yield approximately 7.4 Tcf of natural gas over the LOP, thus decreasing the total purported reserves of natural gas in the Uinta Basin by approximately 29 percent.

In addition to oil and natural gas extraction, impacts on oil and gas reserves are also anticipated. Because these resources are below the surface, they are not susceptible to surface-disturbing activities. However, sub-surface resources could be impacted by drilling through the geologic formations above the targeted formation and subsequent fracturing of the targeted formation to enhance production recovery, as well as direct physical obstructions from well casings.

4.3.1.1.4 Gilsonite, Tar Sands, and Oil Shale

Development related to the Proposed Action could potentially conflict with future development of Gilsonite, oil shale, and tar sands deposits. Direct and indirect impacts to these mineral resources would include potential contamination of the resource by drilling fluids, physical obstruction of resources by well casings, and surface disturbance in the area open to saleable mineral leasing. Some of the leases in the area are combined hydrocarbon leases that allow extraction of oil, gas, oil shale, or tar sands.

Commercial Gilsonite deposits are restricted to the Uinta Basin, and mapped Gilsonite veins cross the MBPA. However, there is no current production or authorized leases within the MBPA. As such, there would be no impacts to Gilsonite leases, because the nearest active lease is located approximately 13 miles southeast of the MBPA. Although expanded oil and gas development could lead to potential conflicts with future Gilsonite exploitation within the MBPA, the probability of such conflict is expected to be low.

Approximately 14,206 acres within the MBPA are classified as STSAs, open to commercial tar sand leasing. Under the Proposed Action, approximately 1,858 acres (13 percent) of STSAs would be impacted by surface disturbance. Approximately 24,966 acres (21 percent) of the MBPA overlies areas of high oil shale development potential defined as KOSLAs. Under the Proposed Action, approximately 2,863 acres (11 percent) of KOSLAs would be impacted by surface disturbance. No impacts are anticipated, because no active mines are present in the area and are unlikely to be developed in the future, given the current density of well bores in the area. However, since these resources are found below the surface, development would be difficult, because existing oil and gas facilities occupying the land would prohibit access to areas below the facilities.

4.3.1.1.5 Other Leasable, Locatable, and Salable Minerals

Implementation of the Proposed Action could potentially conflict with future extraction of sand and gravel from pits in the MBPA. Direct and indirect impacts to these mineral resources would include potential contamination of the resource by drilling fluids, physical obstruction of resources by well casings, and surface disturbance in the area open to saleable mineral leasing. No impacts are anticipated to other locatable minerals such as uranium, base metals, phosphate rock, or gypsum, because no current mining claims have been staked, and little development potential exists to extract minor deposits of these resources.

4.3.1.2 Alternative B – No Action Alternative

Impacts to geological and mineral resources under the No Action Alternative would be similar in nature to those described for the Proposed Action. However, potential impacts would be considerably less under the No Action Alternative, because only 788 new oil and gas wells would be developed on BLM, State and private lands in the MBPA. The overall surface disturbance, both short-term and long-term, would be approximately 870 acres, which is approximately 95 percent less than the Proposed Action.

Development of the 788 wells proposed under the No Action Alternative would result in a potential recovery of an estimated 64 MMbo over the LOP, decreasing the presumed total available oil reserves in the Uinta Basin by approximately 1.2 percent (see **Table 4.3.1.1.3-1**). In addition, implementation of the No Action Alternative would yield approximately 1.2 Tcf of natural gas over the LOP, thus decreasing the total estimated reserves of natural gas in the Uinta Basin by approximately 4.6 percent.

Correspondingly, impacts to physiography and topography; geologic hazards; Gilsonite, tar sands, and oil shale; and other leasable, locatable, and salable minerals within the MBPA would be proportionately less under Alternative B. Under the No Action Alternative, approximately 54 acres (0.2 percent) of KOSLAs and 38 acres (0.3 percent) of STSAs within the MBPA would be impacted by surface disturbance.

4.3.1.3 Alternative C – Field-wide Electrification

Impacts to geological and mineral resources under Alternative C would be nearly identical in nature and scope to those described for the Proposed Action, as the same number of wells would be developed. However, Alternative C would create 3,927 acres more surface disturbance than the Proposed Action, due to the installation of 190 additional miles of transmission and distribution lines and 11 generating stations. Correspondingly, impacts to physiography and topography; geologic hazards; oil and gas resources; Gilsonite, tar sands, and oil shale; and other leasable, locatable, and salable minerals within the MBPA would be identical in character to those described for the Proposed Action, but more extensive.

4.3.1.4 Alternative D – Agency Preferred Alternative

Impacts to geological and mineral resources under Alternative D would be similar in nature to those described for the Proposed Action. However, potential impacts would be less under Alternative D, given the extensive use of multi-well pads and other surface disturbance restrictions. The overall surface disturbance would be approximately 10,122 acres, which is approximately 63 percent of that under the Proposed Action.
For analysis purposes, it is assumed that development of the 5,750 wells proposed under Alternative D would result in potential recovery estimates similar to those disclosed under the Proposed Action.

Impacts to physiography and topography; geologic hazards; Gilsonite, tar sands, and oil shale; and other leasable, locatable, and salable minerals within the MBPA would be proportionately less under Alternative D than under the Proposed Action. Under this alternative, approximately 1,207 acres (5 percent) of KOSLAs and 1,179 acres (8 percent) STSAs within the MBPA would be impacted by surface disturbance.

4.3.2 Mitigation

All applicable Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be incorporated as needed to avoid resource conflicts or impacts to mineral resources.

4.3.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts to mineral resources would include the potential to adversely impact Gilsonite, tar sands, and oil shale through contamination by drilling fluids, physical obstruction of resources by well casings, and surface disturbances in the area open to saleable mineral leasing. This would occur under all of the alternatives to varying degrees, depending on the number of wells developed.

4.3.4 Irretrievable and Irreversible Commitments of Resources

Irretrievable and irreversible resources would include impacts to Gilsonite, tar sands, and oil shale through potential contamination of the resource by drilling fluids and physical obstruction of the resources by well casings. There would also be irretrievable and irreversible impacts to salable minerals, because of surface disturbance in areas open to saleable mineral leasing. This would occur to varying degrees under all of the alternatives, depending on the number of wells developed. All oil and natural gas that is extracted from the MBPA would be irreversibly removed from well sites, and ultimately irretrievable due to their expected consumption.

4.3.5 Relationship of Short-Term Uses to Long-Term Productivity

Because of subsurface impacts to mineral resources, short-term uses would have an adverse impact on long-term productivity for Gilsonite, tar sands, and oil shale in the immediate location of wells. Surface disturbance at well sites would primarily affect long-term productivity for surface resources, such as salable minerals. However, because the acres of mineral resources impacted by all alternatives would be low, and better availability of some resources exist outside the MBPA, overall long-term impacts to the productivity of mineral resource extraction would be minor.

4.4 PALEONTOLOGICAL RESOURCES

The loss of any identifiable fossil that embodies the distinctive characteristics of a type of prehistoric organism or provides information regarding prehistory would be an adverse impact. Direct impacts on paleontological resources would include the potential destruction of paleontological resources and the loss of information associated with these resources. Project excavations may result in the destruction of paleontological resources, and subsequent loss of information, if potentially fossiliferous bedrock or surface sediments are disturbed. Conversely, construction activities might beneficially affect paleontological resources if fossils are exposed that may never have been unearthed by natural means. Such newly exposed fossils would become available for scientific analysis and study, thus adding new information about these resources.

Indirect impacts to paleontological resources would include the compaction or fracturing of surface deposits of fossiliferous bedrock through daily operation of project activities, such as regular road maintenance. Another example of possible adverse indirect impacts would be an increase in unauthorized fossil collection or vandalism due to increased access on newly constructed roads within the MBPA.

In general, the greater the degree of construction-related ground disturbance in the Green River and Uinta formations, the higher the potential for adverse impacts on paleontological resources. Adverse impacts on paleontological resources include direct impacts related to ground-disturbance actions involved with construction of the elements of the Proposed Action, and indirect impacts related to the maintenance of these elements.

The nature of potential impacts on paleontological resources would be the same under all alternatives. However, the extent of impacts would vary by alternative, based on the amount of short-term surface disturbance that would occur on PFYC system Class 2, 3, and 5 lands (see **Table 4.4-1)**. The potential impacts of a general nature that are common to all alternatives are discussed under the Proposed Action. Impacts related to the Proposed Action and other Action Alternatives are compared to those for the No Action Alternative.

TABLE 4.4-1
ACREAGE AND PERCENTAGE OF LAND DISTURBANCE BY ALTERNATIVE IN PFYC-CLASSIFIED AREAS WITH HIGH POTENTIAL TO YIELD FOSSILS

PFYC	Total Acres in MBPA	Alternative A – Proposed Action (percent)	Alternative B - No Action Alternative (percent)	Alternative C – Field-Wide Electrification (percent)	Alternative D – Agency Preferred Alternative (percent)
Class 2	19,945	2,231 (12)	117 (0.6)	2,799 (14)	1,521 (8)
Class 3	6,790	1,188(17)	100 (1.5)	1,408 (21)	596 (9)
Class 5	93,061	12,291 (13)	574 (0.6)	14,887 (16)	7,728 (8)
TOTAL	119,796	15,710 (13)	7,91 (0.7)	19,094 (15)	9,845 (8)

4.4.1 Direct and Indirect Effects

4.4.1.1 Alternative A - Proposed Action

Potential indirect adverse impacts on paleontological resources are most likely to occur where maintenance or future-proposed actions occur in areas containing the bedrock strata of the Green River and Uinta formations. These activities include the grading of access roads and construction of well pads and infrastructure components (i.e., compressor stations, gas processing plant, pump stations, etc.).

Paleontological resources provide scientific data when they are recovered directly from the rock layer in which they were preserved. In most cases, the depth and lateral extent of fossiliferous deposits are unknown until they are discovered, either by chance or as the result of some level of systematic scientific testing. Even if the depth and extent of project-related surface-disturbing activities are known, exact impacts cannot be calculated because the relationship of the discovered fossils to the remaining undiscovered fossils is unknown. Therefore, any analysis of the potential impacts must rely on data that estimate the potential for sensitivity of particular geologic units based on the frequency and density of earlier paleontological surveys and discoveries.

For the Proposed Action, a total of 15,710 acres of PFYC Class 2, 3, and 5 lands (approximately 13 percent of the MBPA) would be involved in surface-disturbing activities (refer to **Table 4.4-1**). Approximately 78 percent (12,291 acres) of the disturbance from the Proposed Action would occur on Class 5 land (i.e., land having the highest potential for fossil material). In addition, approximately 14 percent of the proposed disturbance would occur on Class 2 land (i.e., land having the lowest potential for fossil material), and approximately 8 percent would occur on Class 3 land (i.e., land having moderate or unknown potential for fossil material). The Proposed Action would result in the second highest total surface disturbance in paleontological sensitive land, after only Alternative C, which would involve a total of approximately 19,094 acres.

The ACEPMs outlined in **Section 2.2.12.2** would require paleontological surveys in sensitive areas prior to any surface disturbance. In the event important fossils were identified, work would be temporarily halted until a site-specific mitigation plan is developed and implemented. These actions would minimize direct impacts to surface fossils.

If paleontological monitoring and mitigation procedures were implemented, it is likely that potential adverse impacts could be further minimized, and possibly converted to potential beneficial impacts. Should important fossils be identified, the site-specific recovery/avoidance plan could involve recordation and removal of the discovery from the site for permanent preservation at a repository site for future public education and enjoyment. Any scientifically significant fossils discovered and salvaged as a result of the project’s surface-disturbing activities would benefit the scientific community through an increased knowledge of the fossils and understanding of the contextual setting of the fossils in the basin.

The potential for indirect adverse impacts to paleontological resources as a result of the operations and maintenance activities associated with the Proposed Action is low, because daily operations and maintenance activities would be confined to the pre-disturbed (and thus pre-surveyed) areas. A second potential indirect adverse impact would include a greater risk of illegal fossil collection due to the increased access provided by project-related roads. Under the Proposed Action, approximately 243 miles of new roads would be constructed, which would increase the potential for illegal fossil collection.

4.4.1.2 Alternative B – No Action

Impacts to paleontological resources under the No Action Alternative would be similar in nature and scope to those described for the Proposed Action. However, potential impacts would be considerably less under the No Action Alternative, because only 788 new oil and gas wells would be developed on BLM, State, and private lands in the MBPA. The overall surface disturbance would be approximately 870 acres, which is 95 percent less than the Proposed Action.

Under Alternative B, impacts to fossil resources would result in approximately 791 acres of surface disturbance on PFYC Class 2, 3, and 5 lands (refer to **Table 4.4-1**). Approximately 574 acres (73 percent) of the potential disturbance for Alternative B would occur on Class 5 land. Indirect adverse impacts to paleontological resources associated with an expanded road network would result from 23 miles of new roads, which is a 91 percent decrease as compared to those under the Proposed Action.

4.4.1.3 Alternative C – Field-Wide Electrification

Impacts to paleontological resources under Alternative C would be nearly identical in nature and scope to those described for the Proposed Action. The extent of the impacts to paleontological resources would be the greatest under Alternative C - approximately 25 percent greater than for the Proposed Action. Under Alternative C, a total of approximately 19,094 acres in PFYC-classified areas would be disturbed (refer to **Table 4.4-1**), of which approximately 14,887 acres (78 percent) of the potential disturbance for Alternative C would occur on Class 5 land. Under Alternative C, indirect adverse impacts to paleontological resources associated with an expanded road network would be nearly identical to that of the Proposed Action.

4.4.1.4 Alternative D – Agency Preferred Alternative

Impacts to geological and mineral resources under Alternative D would be similar in nature to those described for the Proposed Action. However, potential impacts from Alternative D would be approximately 50 percent less under Alternative C and 37 percent less than under the Proposed Action. Under Alternative D, approximately 226 miles of new roads would be constructed, which is the second highest total miles of new roads under all the alternatives. As such, Alternative D would pose the second highest threat potential for illegal fossil collection above existing conditions.

For Alternative D, a total of 9,845 acres of PFYC-classified areas would be disturbed (refer to **Table 4.4-1**), of which 78 percent would occur on PFYC Class 5 land. In comparison to the other alternatives, the extent of impacts to PFYC Class 5 lands under Alternative D would be similar (78 percent for the Proposed Action and Alternative C, and 73 percent for Alternative B).

4.4.2 Mitigation

Additional mitigation that is proposed beyond the ACEPMs is detailed in **Section 2.2.12.2**.

4.4.3 Unavoidable Adverse Impacts

At the time fossils are discovered, they have already been subjected to a variety of destructive processes, including a combination of predation, scavenging, disarticulation, transport, and weathering. For each alternative in this EIS, surface disturbance in sensitive areas and increased access to paleontological resources through an expanded road network could exacerbate the destruction of paleontological resources that can result in unavoidable adverse impacts.

These natural processes and human-induced actions would occur to some extent regardless of mitigation, as described above. It is difficult to quantify the impacts to paleontological resources, to measure the effectiveness of mitigation outlined above, and to determine unavoidable adverse impacts for paleontological resources, because fossils are likely to have been damaged by natural processes prior to their discovery. Fossils can be further damaged by construction activities that reveal their presence. Moreover, exact fossil numbers are impossible to quantify, and there is no way to ascertain how many fossils existed at a specific site or within the MBPA prior to construction.

Measurable performance standards in paleontology would ensure that fossil sites are documented thoroughly and accurately and that fossils are collected according to professional paleontological standards. Thus, implementation of ACEPMs detailed in **Section 2.2.12.2** and the recommended monitoring and mitigation procedures would reduce, but not totally negate, unavoidable adverse impacts to paleontological resources.

4.4.4 Irretrievable and Irreversible Commitments of Resources

All direct and indirect adverse impacts would be considered long-term; once fossils are damaged or destroyed, they can never be regenerated or replaced. All commitments of resources therefore would be irreversible.

4.4.5 Relationship of Short-Term Uses to Long-Term Productivity

Implementation of mitigation measures would reduce, but not completely eliminate, impacts to long-term paleontological resources resulting from short-term oil and gas development. Short-term oil and gas development, therefore, would impact long-term paleontological resources through the destruction of these resources during ground-disturbing activities.

4.5 SOILS

All of the alternatives would impact soil resources within the MBPA through surface disturbance associated with road building, pipeline and ancillary facility construction, well drilling, and well-pad development. These activities would impact soils to varying degrees, depending on the amount, placement and type of surface disturbance; the disturbed soil's characteristics; and the surface hydrology.

Soils in the MBPA, as described in **Section 3.5.1**, are generally rated low in reclamation potential. Impacts to soils are typically described in terms of short-term (or initial) and long-term (or residual) impacts. In disturbed areas where interim reclamation is implemented, ground cover by herbaceous species could potentially be re-established within 3 to 4 growing seasons following seeding of native plant species and diligent weed control efforts, consequently reducing soil erosion. These reclaimed areas have often been referred to as short-term disturbances. Surface disturbances could remain as long-term, or even permanent, impacts on the landscape if reclamation efforts are not successful. Successful reclamation is defined as achieving approximately 70% of pre-disturbance land cover. Based on previous experience Newfield anticipates that they will be able to successfully reclaim disturbed areas through the use of self-enforced reclamation methods and monitoring, and strict adherence to the Green River District Reclamation Guidelines. Newfield uses numerous reclamation methods, including:

- Drill seeding
- Broadcast Seeding
- Blow/Chisel/Crimp Straw

- Soil Amendments
- Compost
- Woody Biomass
- Live Mulch
- Soil Blend
- Harrowing
- Imprinting
- Dimpling

The selected method(s) for a site-specific disturbance location is based on site-specific conditions, including the following:

- Timing
- Weed Control
- Soil Type and Temperature
- Intimate Seed Contact, Seeding Window[1]
- Seed Quality, Germination, and Dormancy
- Salt and Sodicity of Soils
- Water

4.5.1 Direct and Indirect Effects

4.5.1.1 Alternative A – Proposed Action

Construction and operation of the proposed project under the Proposed Action would result in short- and long-term impacts to soils within the MBPA. Impacts would result from the clearing of vegetation, as well as the excavation, salvage, stockpiling, and redistribution of soils during construction and reclamation activities associated with well pad sites, access roads, and other proposed project facilities.

Blading or excavation to achieve desired grades could result in slope steepening of exposed soils in cut and fill areas, mixing of topsoil and subsoil materials, and the breakdown of soil aggregates into loose particles. Soil structural aggregates also would be broken down by compaction from vehicular traffic. Removal and stockpiling of topsoil for revegetation purposes could reduce the natural fertility of the soil and cause a loss of soil profiles by mixing soil horizons, with a subsequent breakdown in soil structure.

Implementation of the Proposed Action would result in the direct disturbance of approximately 15,930 acres of soils within the MBPA**.** Following construction, approximately 7,527 acres of initial disturbance (47 percent) associated with construction of proposed well pads, portions of the access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with implementation of the Proposed Action to approximately 8,403 acres. **Table 4.5.1.1-1** provides a summary of short- and long-term surface disturbances associated with each soil mapping unit on lands in the MBPA that would be disturbed under the Proposed Action. Approximately 90 percent of the proposed surface disturbance under the Proposed Action would occur on soils that have a low restoration potential rating.

[1] The term ''intimate seed contact'' means achieving proper seed planting depths, and ''seeding window'' means seeding during the best possible season/weather patterns.

TABLE 4.5.1.1-1
SUMMARY OF SOIL DISTURBANCE BY SOIL TYPE FOR THE PROPOSED ACTION

Soil Map Unit	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)	Restoration Potential Rating
Badland-Rock outcrop complex, 1 to 100 percent slopes (12)	369	165	Not Rated
Boreham loam, 0 to 2 percent slopes (27)	1,772	854	Low
Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (EZF2)	355	136	Not Rated
Cadrina-Casmos-Rock outcrop complex, 2 to 40 percent slopes (38)	967	484	Low
Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes (36)	2	1	Low
Cakehill sandy loam, 2 to 5 percent slopes (41)	249	123	Low
Cheeta-Rock outcrop complex, 30 to 80 percent slopes (RAL)	73	34	Low
Ioka-Cadrina complex, 2 to 25percent slopes (115)	175	75	Low
Ioka very gravelly sandy loam, 0 to 3 percent slopes (113)	32	11	Low
Ioka very gravelly sandy loam, 4 to 25 percent slopes (114)	220	133	Low
Jenrid-Green River Complex, 0 to 2 percent slopes (122)	44	12	Low
Jenrid sandy loam, 0 to 2 percent slopes (120)	172	84	Low
Kilroy loam, 1 to 4 percent slopes (123)	1,037	568	Low
Leebench sandy loam, 0 to 2 percent slopes (128)	353	160	Low
Leeko loam, 0 to 4 percent slopes (129)	192	86	Low
Mikim loam, 2 to 5 percent slopes (MaB)	35	51	Moderate
Mikim silt loam, 2 to 4 percent slopes (138)	3	2	Low
Motto-Muff-Rock Outcrop complex, 2 to 25 percent slopes (153)	283	146	Low
Motto-Rock outcrop complex, 2 to 25 percent slopes (154)	2,391	951	Low
Motto-Uffens complex, 2 to 25 percent slopes (155)	160	64	Low
Muff gravelly sandy loam, 2 to 8 percent slopes (158)	592	238	Low
Nakoy loamy fine sand, 1 to 5 percent slopes (160)	188	91	Low
Pariette gravelly sandy loam, 2 to 8 percent slopes (173)	614	294	Low
Pherson-Hickerson complex, 1 to 8 percent slopes (179)	6,768	31	Low
Rock outcrop (193)	5	2	Not Rated
Shotnick sandy loam, 2 to 4 percent slopes (206)	41	24	Low
Smithpond-Montwel-Badland association, 3 to 25 percent slopes (142)	449	254	Moderate
Uffens-Rock Outcrop complex, 15 to 25 percent slopes (CZE2)	201	90	Not Rated

Soil Map Unit	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)	Restoration Potential Rating
Uffens loam, 3 to 8 percent slopes (249)	938	470	Low
Uffens sandy loam, 0 to 2 percent slopes (250)	258	121	Low
Umbo silty clay loam, 0 to 2 percent slopes (252)	121	57	Low
Walknolls-Rock outcrop complex, 2 to 50 percent slopes (264)	350	176	Low
Walknolls-Uendal association, 2 to 25 percent slopes (266)	2,453	1,216	Low
Walknolls extremely channery sandy loam, 4 to 25 percent slopes (256)	487	224	Low
Water (258)	7	4	Not Rated
Undocumented	216	87	Not Rated
Totals	**15,930**	**7,527**	**--**

4.5.1.1.1 Erosion and Sedimentation

Soils would also be susceptible to increased erosion in newly disturbed areas. The removal of vegetative cover, steepening of slopes, and the breakdown of aggregates resulting from the construction of roads, well pads, and other project facilities would increase the potential for channelized runoff and accelerated soil erosion. Typically, well-pad construction results in a cut slope, a level well pad, and a fill slope. Cut slopes would typically be bare of vegetation and steeper than the surrounding slope, increasing the rate of sedimentation. The sediment from the cut slopes would be deposited on the well-pad site. Because they are typically steeper, less consolidated, and devoid of vegetation, fill slopes would also increase the amount of sedimentation, their sediment being delivered to the area adjacent to the fill slopes.

The removal of 15,930 acres of vegetation under the Proposed Action would increase the potential for channelized runoff and accelerated erosion to occur, with a corresponding increase in rill and gully erosion where disturbance occurs on steeper slopes and drainages. Erosion would be particularly evident if project related activities are conducted during periods of high precipitation. The increased erosion of soils could potentially lead to increased loss of vegetative cover and increased sedimentation in ephemeral drainages, Pariette Draw, the Green River, and/or other unnamed drainages. The actual amount of additional sedimentation that would reach the drainages within the MBPA would depend on the effectiveness of reclamation and erosion control measures, as well as natural factors including the water available for overland flow; the texture of the eroded material, the amount and kind of ground cover; the shape, gradient, and length of the slope; and surface roughness (Barfield et al. 1981). Wind erosion could also increase with removal of vegetation and exposure of soils.

In order to estimate potential erosion and sediment yield increases associated with the Proposed Action and alternatives, the Water Erosion Prediction Project (WEPP) Roads (WEPP:Road) model, developed by the USFS, was used to predict erosion rates and sediment yields from roads (Elliot et al. 2000), and the Revised Universal Soil Loss Equation (RUSLE2) model, developed by the U.S. Department of Agriculture (USDA) - Agricultural Research Service, were used to predict erosion rates and sediment yields from well pads and other facilities (USDA 2005). **Appendix F** describes the WEPP:Road and RUSLE2 models, as well as the assumptions and methods used to estimate the additional erosion that would be generated by the implementation of the Proposed Action and alternatives. Data such as precipitation, soil type, topography, land cover, and BMPs were used for soil modeling using the RUSLE2 and WEPP:Road models.

Erosion calculations were performed for both the construction and development phase and production phase of the Project. New roads and upgrades to existing roads were modeled separately from well pad and other facility construction, so that a direct comparison could be made between the amount of erosion that would occur from road construction under the alternatives and the amount of erosion that would occur from the construction of well pads and other non-linear facilities.

Based on the model results, an estimated 236 tons of soil would be eroded annually in the short-term (about 1 to 7 years) under the Proposed Action (see **Table 4.5.1.1.1-1**). This includes approximately 3.85 tons generated from the construction of well pads and other facilities and 231 tons generated from road and pipeline construction, which collectively constitutes less than a 0.1 percent increase over the current estimated background erosion rate of 204,732 tons per year. Over the long term (8 to 20 years), the estimated additional erosion from road construction and the construction of well pads and other facilities would be 254 tons per year, which collectively constitutes less than a 0.1 percent increase over the current estimated background erosion rate.

TABLE 4.5.1.1.1-1

TOTAL ESTIMATED ANNUAL SOIL EROSION UNDER THE PROPOSED ACTION

Erosion Source	Existing Erosion (tons/year)	Construction and Development Phase[1] (tons/year)	Production Phase[2] (tons/year)
Well Pads	--*	3.9	--*
Access Roads and Pipelines[3]	183	231	254
Other Facilities	--*	0.7	--*
Total Project Contribution	**--**	**236**	**254**
Natural Sources (background)	204,732	204,732	204,732
Annual Total for MBPA	**204,915**	**204,968**	**204,986**
Percent Increase from Project	**--**	**<0.1**	**<0.1**

*Surfaces would be either reclaimed, covered with gravel, or surface hardened, which would result in negligible amounts of soil erosion.

[1] Construction and development would involve well drilling, pad development and completion activities and would be complete following the 16-year well drilling phase and upon completion of interim reclamation.

[2] The production phase would be initiated following interim reclamation, would include the remaining LOP, and would be completed following successful final reclamation.

[3] For purposes of analysis, it is assumed that all access roads and pipelines would be constructed within the first year; therefore, the value in tons/year for the construction and development phase is equal to the total amount of soil eroded for the entire project phase.

Source Note: Summations may not total precisely due to rounding.

Most of the erosion and sediment associated with well pads and other facilities would occur during the early stages of construction and operation of the facilities, prior to interim reclamation. The majority of the sediment created from the proposed well pads and other project facilities is expected to be deposited onto adjacent undisturbed areas, and only a fraction of this total would be delivered to area drainages. Once well pads and other facilities are constructed, they would be surfaced with gravel, which would result in a substantial decrease in the rate of sedimentation that is expected to be negligible over the long-term (see **Table 4.5.1.1.1-1)**. It is expected that following construction activities, re-vegetation, and five to seven growing seasons, erosion and sedimentation rates would decrease to near baseline conditions for well pads and other facilities. This is supported by a study conducted by Swift (1984) that showed placement of gravel on a disturbed surface reduced sediment production from 70 to 92 percent (depending on the thickness of the gravel layer used) from unsurfaced conditions over a 5-month period.

The greatest contribution to erosion and sedimentation rates under the Proposed Action would come from the construction and use of access roads within the MBPA. Erosion and sedimentation rates would be expected to remain at elevated levels for the access roads over the LOP, even in the absence of high traffic volumes. Unlike well pad sites and other facilities, access roads are located in areas with steeper slopes that would result in increased runoff velocity, which in turn would increase erosion and off-site sedimentation. Access roads also parallel or intersect drainages, which would increase the efficiency and rate at which sediment is delivered to area drainages. This is supported by the fact that, of the estimated 243 miles of new roads proposed to be constructed under the Proposed Action, there are approximately 953 locations where these roads cross or intersect an ephemeral drainage. Because erosion and sedimentation rates for access roads constructed over the LOP are not directly additive for each subsequent year of new road construction, all erosion and sedimentation associated with the construction of approximately 243 miles of new roads under the Proposed Action were calculated up front. For purposes of analysis, it was assumed that all of the roads would be constructed during the first year of the Project, when in fact they would actually be constructed over a 16-year period (see **Table 4.5.1.1.1-1**).

Of the estimated annual erosion of 236 tons associated with the Proposed Action, about 26 percent of this amount (62 tons) would be delivered to the network of ephemeral drainages within the MBPA. Once delivered to an ephemeral drainage, the sediment would then be available for transport. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. A more detailed discussion of sedimentation is provided under **Section 4.6.1.1.1.4**, *Surface Water Resources*.

The proposed mitigation measures described in **Section 4.5.2** would be implemented during construction to avoid or minimize soil erosion and off-site deposition. Based on these measures and implementation of ACEPMs, there would be limited adverse impacts on soil resources as a result of implementation of the Proposed Action.

4.5.1.1.2 Soil Contamination

Sources of potential soil contamination include leaks or spills of natural gas condensate liquids from wellheads, gas and water lines, produced water sumps, and condensate storage tanks. To reduce the potential for hydrocarbon contamination of soils, gas lines and water lines would be designed to minimize the potential for spills and leaks. Storage tanks would be surrounded by berms capable of holding at least 110 percent of the largest single tank volume. Leaks or spills of saline water, hydrofracturing chemicals, fuels, and lubricants could also result in soil contamination. Depending on the size and type of spill, the effect on soils would primarily consist of the potential loss of soil productivity. Implementation of the project SPCC plan would minimize the risk of such spills by providing safeguards against spills and detailing reporting and cleanup measures to be taken in the event of a spill. Thus, the potential for impacts to soils from spills is considered minor.

4.5.1.1.3 Destruction of Biological Soil Crusts

Mapping of BSCs has not been performed in the MBPA. However, based upon the physical and biological characteristics of the existing soils, BSCs could occur. BSCs are commonly associated with pinyon-juniper woodlands and sagebrush communities, both of which would be disturbed under the Proposed Action. BSCs are vulnerable to vehicle traffic, livestock grazing, and pedestrian traffic. The fibers that compose the tensile strength of BSCs are weak in comparison to the compressional strength placed on the crusts by machinery, human footprints, big game, and livestock. The impact of a given surface disturbance on BSCs depends upon its severity, frequency, timing, and type, as well as the weather conditions during and after the disturbance (Belnap et al. 2001). BSCs occurring in the MBPA have been largely disturbed by previous oil and gas development and by livestock grazing. Surface disturbances associated with the Proposed Action could add to these disturbances by breaking, overturning, and burying soil crusts to various degrees (Belnap et al. 2001).

4.5.1.2 Alternative B - No Action Alternative

The nature and scope of direct and indirect impacts to soils under the No Action Alternative would be similar to those for the Proposed Action, but of less magnitude. Under the No Action Alternative, Newfield would continue to construct roads, well pads, and ancillary facilities to complete up to 788 wells, including those proposed on State and private lands or minerals, as well as those previously approved under the August 2005 ROD for the Castle Peak and Eightmile Flat Oil and Gas Expansion EIS (BLM 2005a).

Approximately 805 acres of soil would initially be disturbed during the construction of the No Action Alternative, prior to interim reclamation. This represents approximately 0.7 percent of the total 119,804 acres within the MBPA. Those portions of the well pads, access road ROWs, pipeline ROWs, and other facilities not needed for production operations would be reclaimed within three to four growing seasons following completion of the respective project facility. What remains after successful interim reclamation would be a long-term disturbance of approximately 617 acres, or 0.6 percent of the MBPA for the estimated 28-to 38-year LOP.

Table 4.5.1.2-1 below provides the amount of short- and long-term surface disturbance for each of the soil map units within the MBPA that would be disturbed under Alternative B. For Alternative B, approximately 92 percent of the surface disturbance would occur on soils that have a low restoration potential rating.

TABLE 4.5.1.2-1
SUMMARY OF SOIL DISTURBANCE BY SOIL TYPE FOR ALTERNATIVE B – NO ACTION

Soil Map Unit	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)	Restoration Potential Rating
Badland-Rock outcrop complex, 1 to 100 percent slopes (12)	13	10	Not Rated
Boreham loam, 0 to 2 percent slopes (27)	144	105	Low
Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (EZF2)	3	3	Not Rated
Cadrina-Casmos-Rock outcrop complex, 2 to 40 percent slopes (38)	82	61	Low
Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes (36)	--	--	Low
Cakehill sandy loam, 2 to 5 percent slopes (41)	3	2	Low
Cheeta-Rock outcrop complex, 30 to 80 percent slopes (RAL)	12	7	Low
Ioka-Cadrina complex, 2 to 25percent slopes (115)	7	5	Low

Soil Map Unit	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)	Restoration Potential Rating
Ioka very gravelly sandy loam, 0 to 3 percent slopes (113)	0	0	Low
Ioka very gravelly sandy loam, 4 to 25 percent slopes (114)	9	6	Low
Jenrid-Green River Complex, 0 to 2 percent slopes (122)	0	0	Low
Jenrid sandy loam, 0 to 2 percent slopes (120)	2	2	Low
Kilroy loam, 1 to 4 percent slopes (123)	68	52	Low
Leebench sandy loam, 0 to 2 percent slopes (128)	24	17	Low
Leeko loam, 0 to 4 percent slopes (129)	1	1	Low
Mikim loam, 2 to 5 percent slopes (MaB)	5	4	Moderate
Mikim silt loam, 2 to 4 percent slopes (138)	--	--	Low
Motto-Muff-Rock Outcrop complex, 2 to 25 percent slopes (153)	12	12	Low
Motto-Rock outcrop complex, 2 to 25 percent slopes (154)	95	76	Low
Motto-Uffens complex, 2 to 25 percent slopes (155)	2	2	Low
Muff gravelly sandy loam, 2 to 8 percent slopes (158)	18	16	Low
Nakoy loamy fine sand, 1 to 5 percent slopes (160)	6	5	Low
Pariette gravelly sandy loam, 2 to 8 percent slopes (173)	39	37	Low
Pherson-Hickerson complex, 1 to 8 percent slopes (179)	2	1	Low
Rock outcrop (193)	0	0	Not Rated
Shotnick sandy loam, 2 to 4 percent slopes (206)	--	--	Low
Smithpond-Montwel-Badland association, 3 to 25 percent slopes (142)	26	19	Moderate
Uffens-Rock Outcrop complex, 15 to 25 percent slopes (CZE2)	13	12	Not Rated
Uffens loam, 3 to 8 percent slopes (249)	5	4	Low
Uffens sandy loam, 0 to 2 percent slopes (250)	4	3	Low
Umbo silty clay loam, 0 to 2 percent slopes (252)	17	13	Low
Walknolls-Rock outcrop complex, 2 to 50 percent slopes (264)	38	27	Low
Walknolls-Uendal association, 2 to 25 percent slopes (266)	117	91	Low
Walknolls extremely channery sandy loam, 4 to 25 percent slopes (256)	35	23	Low
Water (258)	--	--	Not Rated
Unclassified	1	1	Not Rated
Total	**805**	**617**	**--**

4.5.1.2.1 Erosion and Sediment Yield

Impacts from erosion and sedimentation under the No Action Alternative would be similar in nature and scope to those described for the Proposed Action. However, potential impacts would be considerably less under the No Action Alternative, as only 788 new oil and gas wells, 23 miles of new roads, and seven facilities would be developed on BLM, State and private lands in the MBPA. The overall surface disturbance would be approximately 805 acres, which is 95 percent less than the Proposed Action.

Under the No Action Alternative, an estimated 179 tons of soil would be eroded annually in the short-term (about 1 to 7 years) (see **Table 4.5.1.2.1-1**). This includes 0.56 tons per year generated from the construction of well pads and other facilities and 178 tons generated from road and pipeline construction, which collectively constitutes less than a 0.1 percent increase over the current estimated background erosion rate of 204,732 tons per year. Over the long term (8 to 20 years), the estimated additional erosion from road construction and the construction of well pads and other facilities would be an estimated 193 tons per year, which collectively constitutes less than a 0.1 percent increase over the current estimated background erosion rate.

Of the estimated annual erosion of 179 tons of soil associated with the No Action Alternative, about 30 percent of this amount (53 tons) would be delivered to the network of ephemeral drainages within the MBPA. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. A more detailed discussion of sedimentation is provided under **Section 4.6.1.1.1.4**, *Surface Water Resources*.

TABLE 4.5.1.2.1-1
TOTAL ESTIMATED ANNUAL SOIL EROSION UNDER ALTERNATIVE B - NO ACTION ALTERNATIVE

Erosion Source	Existing Erosion (tons/year)	Construction and Development Phase[1] (tons/year)	Production Phase[2] (tons/year)
Well Pads	--*	0.6	--*
Access Roads and Pipelines[3]	183	178	193
Other Facilities	--*	--*	--*
Total Project Contribution	**--**	**179**	**193**
Natural Sources (background)	204,732	204,732	204,732
Annual Total for MBPA	**204,915**	**204,911**	**204,925**
Percent Increase from Project	**--**	**<0.1**	**<0.1**

*Surfaces would be either reclaimed, covered with gravel, or surface hardened, which would result in negligible amounts of soil erosion.
[1] Construction and development would involve well drilling, pad development and completion activities and would be complete following the 2.2-year well drilling phase and upon completion of interim reclamation.
[2] The production phase would be initiated following interim reclamation, would include the remaining LOP, and would be completed following successful final reclamation.

[3]For purposes of analysis, it is assumed that all access roads and pipelines would be constructed within the first year; therefore, the value in tons/year for the construction and development phase is equal to the total amount of soil eroded for the entire project phase.
Source Note: Summations may not total precisely due to rounding.

4.5.1.2.2 Soil Contamination and Biological Soil Crusts

Because the distribution of BSCs within the MBPA is unknown, a decrease in surface disturbance is assumed to correspond to a similar decrease in impacts to soil crusts. Under the No Action, the overall surface disturbance would be approximately 805 acres, which is 95 percent less than the Proposed Action. This alternative would therefore have the least risk of impacting BSCs of any alternative, because the smallest areas of vegetation communities associated with soil crusts would be disturbed.

Correspondingly, the potential for soil contamination from leaks or spills of natural gas condensate liquids from wellheads, gas and water lines, produced water sumps, and condensate storage tanks would be proportionally less than that of the Proposed Action. It would be the lowest of all alternatives considered. For the same reasons as previously described under the Proposed Action, the potential for impacts to soils from spills is considered minor.

4.5.1.3 Alternative C – Field-Wide Electrification

Direct and indirect impacts to soils under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would have an additional 3,414 acres of surface disturbance due to the installation of transmission lines and substations. Approximately 19,344 acres of soil would initially be disturbed during the construction of Alternative C, prior to interim reclamation. This represents approximately 16 percent of the total 119,804 acres within the MBPA. Assuming reclamation is successful, those portions of the well pads, access road ROWs, pipeline ROWs, and other facilities not needed for production operations would be reclaimed within three to four growing seasons following completion of the respective project facility, and with diligent weed control efforts would consequently reduce soil erosion. What remains after successful interim reclamation would be a “long-term” disturbance of approximately 9,748 acres, or 8 percent of the MBPA for the estimated 41-to 51-year LOP. **Table 4.5.1.3-1** provides the amount of short- and long-term surface disturbance for each of the soil map units within the MBPA that would be disturbed under Alternative C. For Alternative C, approximately 89 percent of the surface disturbance would occur on soils that have a low restoration potential rating.

TABLE 4.5.1.3-1
SUMMARY OF SOIL DISTURBANCE BY SOIL TYPE FOR ALTERNATIVE C – FIELD-WIDE ELECTRIFICATION

Soil Map Unit	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)	Restoration Potential Rating
Badland-Rock outcrop complex, 1 to 100 percent slopes (12)	452	214	Not Rated
Boreham loam, 0 to 2 percent slopes (27)	2,136	1,125	Low
Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (EZF2)	397	191	Not Rated
Cadrina-Casmos-Rock outcrop complex, 2 to 40 percent slopes (38)	1,198	600	Low

Soil Map Unit	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)	Restoration Potential Rating
Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes (36)	3	1	Low
Cakehill sandy loam, 2 to 5 percent slopes (41)	308	157	Low
Cheeta-Rock outcrop complex, 30 to 80 percent slopes (RAL)	83	35	Low
Ioka-Cadrina complex, 2 to 25percent slopes (115)	201	103	Low
Ioka very gravelly sandy loam, 0 to 3 percent slopes (113)	34	15	Low
Ioka very gravelly sandy loam, 4 to 25 percent slopes (114)	307	154	Low
Jenrid-Green River Complex, 0 to 2 percent slopes (122)	55	26	Low
Jenrid sandy loam, 0 to 2 percent slopes (120)	214	103	Low
Kilroy loam, 1 to 4 percent slopes (123)	1,344	691	Low
Leebench sandy loam, 0 to 2 percent slopes (128)	442	223	Low
Leeko loam, 0 to 4 percent slopes (129)	232	110	Low
Mikim loam, 2 to 5 percent slopes (MaB)	114	62	Moderate
Mikim silt loam, 2 to 4 percent slopes (138)	3	2	Low
Motto-Muff-Rock Outcrop complex, 2 to 25 percent slopes (153)	333	191	Low
Motto-Rock outcrop complex, 2 to 25 percent slopes (154)	2,816	1,404	Low
Motto-Uffens complex, 2 to 25 percent slopes (155)	177	87	Low
Muff gravelly sandy loam, 2 to 8 percent slopes (158)	666	333	Low
Nakoy loamy fine sand, 1 to 5 percent slopes (160)	233	109	Low
Pariette gravelly sandy loam, 2 to 8 percent slopes (173)	698	360	Low
Pherson-Hickerson complex, 1 to 8 percent slopes (179)	77	37	Low
Rock outcrop (193)	5	3	Not Rated
Shotnick sandy loam, 2 to 4 percent slopes (206)	68	37	Low
Smithpond-Montwel-Badland association, 3 to 25 percent slopes (142)	592	317	Moderate
Uffens-Rock Outcrop complex, 15 to 25 percent slopes (CZE2)	242	119	Not Rated
Uffens loam, 3 to 8 percent slopes (249)	1,197	593	Low
Uffens sandy loam, 0 to 2 percent slopes (250)	306	152	Low
Umbo silty clay loam, 0 to 2 percent slopes (252)	138	78	Low
Walknolls-Rock outcrop complex, 2 to 50 percent slopes (264)	440	212	Low
Walknolls-Uendal association, 2 to 25 percent slopes (266)	2,987	1,506	Low

Soil Map Unit	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)	Restoration Potential Rating
Walknolls extremely channery sandy loam, 4 to 25 percent slopes (256)	598	272	Low
Water (258)	13	5	Not Rated
Undocumented	241	124	Not Rated
Total	**19,344**	**9,748**	**--**

4.5.1.3.1 Erosion and Sediment Yield

Impacts from erosion and sedimentation under Alternative C would be nearly identical to those described for the Proposed Action, except that Alternative C would have an additional 3,414 acres of surface disturbance due to the installation of transmission lines and substations. The overall surface disturbance would be approximately 19,344 acres, which is 21 percent greater than that of the Proposed Action.

Under Alternative C, an estimated 235 tons of soil would be eroded annually in the short-term (about 1 to 7 years) (see **Table 4.5.1.3.1-1**). This includes approximately 3.85 tons generated from the construction of well pads and other facilities and 231 tons generated from road and pipeline construction, which collectively constitutes less than a 0.1 percent increase over the current estimated background erosion rate of 204,732 tons per year. Over the long term (8 to 20 years), the estimated additional erosion from road construction and the construction of well pads and other facilities would be an estimated 254 tons per year which collectively constitutes less than a 0.1 percent increase over the current estimated background erosion rate.

Of the estimated annual erosion of 235 tons associated with Alternative C, about 26 percent of this amount (62 tons) would be delivered to the network of ephemeral drainages within the MBPA. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. A more detailed discussion of sedimentation is provided under **Section 4.6.1.1.1.4**, *Surface Water Resources*.

TABLE 4.5.1.3.1-1
TOTAL ESTIMATED ANNUAL SOIL EROSION UNDER ALTERNATIVE C

Erosion Source	Existing Erosion (tons/year)	Construction and Development Phase[1] (tons/year)	Production Phase[2] (tons/year)
Well Pads	--*	3.9	--*
Access Roads and Pipelines[3]	183	231	254
Other Facilities	--*	--*	--*
Total Project Contribution	**--**	**235**	**254**
Non Anthropogenic Sources (background)	204,732	204,732	204,732
Annual Total for MBPA	**204,915**	**204,967**	**204,986**
Percent Increase from Project	**--**	**<0.1**	**<0.1**

*Surfaces would be either reclaimed, covered with gravel, or surface hardened, which would result in negligible amounts of soil erosion.

[1] Construction and development would involve well drilling, pad development and completion activities and would be complete following the 16-year well drilling phase and upon completion of interim reclamation.
[2]The production phase would be initiated following interim reclamation, would include the remaining LOP, and would be completed following successful final reclamation.
[3]For purposes of analysis, it is assumed that all access roads and pipelines would be constructed within the first year; therefore, the value in tons/year for the construction and development phase is equal to the total amount of soil eroded for the entire project phase.
Source Note: Summations may not total precisely due to rounding.

4.5.1.3.2 Soil Contamination and Biological Soil Crusts

Because the distribution of BSCs within the MBPA is unknown, an increase in surface disturbance is assumed to correspond to a similar increase in impacts to soil crusts. Under Alternative C, the overall surface disturbance would be approximately 19,344 acres, which is 21 percent more than the Proposed Action. This alternative would therefore have the greatest potential for impacts to BSCs of any alternative.

Correspondingly, the potential for soil contamination from leaks or spills of natural gas condensate liquids from wellheads, gas and water lines, produced water sumps, and condensate storage tanks would be identical to that of the Proposed Action, because an identical number of wells would be drilled (5,750) and associated project facilities would be constructed. For the same reasons as previously described under the Proposed Action, the potential for impacts to soils from spills is considered minor.

4.5.1.4 Alternative D – Agency Preferred Alternative

Impacts to soils under Alternative D would be similar in nature and scope to those described for the Proposed Action. However, the magnitude of potential impacts would be less under Alternative D, because 692 fewer oil and gas wells would be drilled, fewer new well pads would be constructed, many of the well pads that are constructed would be precluded from sensitive areas, and the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology.

Approximately 9,968 acres of soil would initially be disturbed under implementation of Alternative D, which is 63 percent less than that under the Proposed Action. This represents approximately 8 percent of the total 119,804 acres within the MBPA. Assuming enhanced reclamation measures are successful, those portions of the well pads, access road ROWs, pipeline ROWs, and other facilities not needed for production operations would be reclaimed within three to four growing seasons following completion of the respective project facility. Approximately 5,161 acres of initial disturbance (52 percent) associated with construction of proposed well pads, road and pipeline ROWs, and other project facilities not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with implementation of Alternative D to approximately 4,807 acres, which is the lowest among all the action alternatives considered.

Based on previous experience, Newfield anticipates that they will be able to successfully reclaim disturbed areas through the use of self-enforced reclamation methods and monitoring and strict adherence to the Green River District Reclamation Guidelines. Newfield uses numerous reclamation methods, including:

- Drill seeding
- Broadcast Seeding
- Blow/Chisel/Crimp Straw
- Soil Amendments

- Compost
- Woody Biomass
- Live Mulch
- Soil Blend
- Harrowing
- Imprinting
- Dimpling

The selected method(s) for a site-specific disturbance location is based on site-specific conditions, including the following:

- Timing
- Weed Control
- Soil Type and Temperature
- Intimate Seed Contact, Seeding Window[2]
- Seed Quality, Germination, and Dormancy
- Water
- Salt and Sodicity of Soils

Table 4.5.1.4-1 below provides the amount of short- and long-term surface disturbance for each of the soil map units within the MBPA that would be disturbed under Alternative D. For Alternative D, approximately 89 percent of the surface disturbance would occur on soils that have a low restoration potential rating.

TABLE 4.5.1.4-1
SUMMARY OF SOIL DISTURBANCE BY SOIL TYPE
FOR ALTERNATIVE D – AGENCY PREFERRED ALTERNATIVE

Soil Map Unit	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)	Restoration Potential Rating
Badland-Rock outcrop complex, 1 to 100 percent slopes (12)	238	109	Not Rated
Boreham loam, 0 to 2 percent slopes (27)	1,054	537	Low
Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (EZF2)	163	70	Not Rated
Cadrina-Casmos-Rock outcrop complex, 2 to 40 percent slopes (38)	701	333	Low
Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes (36)	4	2	Low
Cakehill sandy loam, 2 to 5 percent slopes (41)	169	84	Low
Cheeta-Rock outcrop complex, 30 to 80 percent slopes (RAL)	71	35	Low
Ioka-Cadrina complex, 2 to 25percent slopes (115)	93	44	Low
Ioka gravelly sandy loam, 0 to 3 percent slopes (113)	13	5	Low

[2] The term ‘‘intimate seed contact’’ means achieving proper seed planting depths, and ‘‘seeding window’’ means seeding during the best possible season/weather patterns.

Soil Map Unit	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)	Restoration Potential Rating
Ioka very gravelly sandy loam, 4 to 25 percent slopes (114)	169	154	Low
Jenrid-Green River complex, 0 to 2 percent slopes (122)	1	0	Low
Jenrid sandy loam, 0 to 2 percent slopes (120)	84	35	Low
Kilroy loam, 1 to 4 percent slopes (123)	838	415	Low
Leebench sandy loam, 0 to 2 percent slopes (128)	232	105	Low
Leeko loam, 0 to 4 percent slopes (129)	121	53	Low
Mikim loam, 2 to 5 percent slopes (MaB)	63	36	Moderate
Mikim silt loam, 2 to 4 percent slopes (138)	2	1	Low
Motto-Muff-Rock Outcrop complex, 2 to 25 percent slopes (153)	216	125	Low
Motto-Rock outcrop complex, 2 to 25 percent slopes (154)	1,136	516	Low
Motto-Uffens complex, 2 to 25 percent slopes (155)	75	31	Low
Muff gravelly sandy loam, 2 to 8 percent slopes (158)	241	116	Low
Nakoy loamy fine sand, 1 to 5 percent slopes (160)	141	67	Low
Pariette gravelly sandy loam, 2 to 8 percent slopes (173)	396	189	Low
Pherson-Hickerson complex, 1 to 8 percent slopes (179)	38	18	Low
Rock outcrop (193)	1	1	Not Rated
Shotnick sandy loam, 2 to 4 percent slopes (206)	42	20	Low
Smithpond-Montwel-Badland association, 3 to 25 percent slopes (142)	343	180	Moderate
Uffens-Rock Outcrop complex, 15 to 25 percent slopes (CZE2)	95	46	Not Rated
Uffens loam, 3 to 8 percent slopes (249)	711	368	Low
Uffens sandy loam, 0 to 2 percent slopes (250)	143	59	Low
Umbo silty clay loam, 0 to 2 percent slopes (252)	37	16	Low
Walknolls-Rock outcrop complex, 2 to 50 percent slopes (264)	271	130	Low
Walknolls-Uendal association, 2 to 25 percent slopes (266)	1,556	743	Low
Walknolls extremely channery sandy loam, 4 to 25 percent slopes (256)	392	184	Low
Water (258)	5	2	Not Rated
Unclassified	104	46	Not Rated
Total	**9,968**	**4,807**	**--**

4.5.1.4.1 Erosion and Sediment Yield

Impacts to soils from increased erosion and sedimentation under Alternative D would be similar in nature and scope to those described for the Proposed Action. However, the magnitude of potential impacts would be less under Alternative D due to the substantial decrease in the amount of short- and long-term surface disturbance as compared to that of the Proposed Action.

Under Alternative D, an estimated 235 tons of soil would be eroded annually in the short-term (about 1 to 7 years) (see **Table 4.5.1.4.1-1**). This includes approximately 3.65 tons generated from the construction of well pads and other facilities and 231 tons generated from road and pipeline construction, which collectively constitutes less than a 0.1 percent increase over the current estimated background erosion rate of 204,732 tons per year. Over the long term (8 to 20 years), the estimated additional erosion from road construction and the construction of well pads and other facilities would be 251 tons per year, which collectively constitutes less than a 0.1 percent increase over the current estimated background erosion rate.

Of the estimated annual erosion of 235 tons associated with Alternative D, about 28 percent of this amount (66 tons) would be delivered to the network of ephemeral drainages within the MBPA. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. A more detailed discussion of sedimentation is provided under **Section 4.6.1.1.1.4**, *Surface Water Resources*.

TABLE 4.5.1.4.1-1
TOTAL ESTIMATED ANNUAL SOIL EROSION UNDER ALTERNATIVE D - AGENCY PREFERRED ALTERNATIVE

Erosion Source	Existing Erosion (tons/year)	Construction and Development Phase[1] (tons/year)	Production Phase[2] (tons/year)
Well Pads	--*	3.7	--*
Access Roads and Pipelines[3]	183	231	251
Other Facilities	--*	--*	--*
Total Project Contribution	**--**	**235**	**251**
Natural Sources (background)	204,732	204,732	204,732
Annual Total for MBPA	**204,915**	**204,967**	**204,983**
Percent Increase from Project	**--**	**<0.1**	**<0.1**

*Surfaces would be either reclaimed, covered with gravel or surface hardened which would result in negligible amounts of soil erosion.
[1] Construction and development would involve well drilling, pad development and completion activities and would be complete following the 14-year well drilling phase and upon completion of interim reclamation.
[2]The production phase would be initiated following interim reclamation, would include the remaining LOP, and would be completed following successful final reclamation.
[3]For purposes of analysis, it is assumed that all access roads and pipelines would be constructed within the first year; therefore, the value in tons/year for the construction and development phase is equal to the total amount of soil eroded for the entire project phase.
Source Note: Summations may not total precisely due to rounding.

4.5.1.4.2 Soil Contamination and Biological Soil Crusts

Because the distribution of BSCs within the MBPA is unknown, a decrease in surface disturbance is assumed to correspond to a similar decrease in impacts to soil crusts. Under Alternative D, the overall surface disturbance would be approximately 9,968 acres, which is 63 percent less than the Proposed Action.

This alternative would therefore have the lower risk of impacting BSCs than any of the action alternatives considered, because the smallest areas of vegetation communities associated with soil crusts would be disturbed.

Correspondingly, the potential for soil contamination from leaks or spills of natural gas condensate liquids from wellheads, gas and water lines, produced water sumps, and condensate storage tanks would be proportionally less than that of the Proposed Action. It would be the lowest of all action alternatives considered. For the same reasons as previously described under the Proposed Action, the potential for impacts to soils from spills is considered minor.

4.5.2 Mitigation

In addition to the ACEPMs detailed in **Section 2.2.12.3**, mitigation measures could be used to lessen impacts caused to soils, reduce expected increases in erosion rates and sediment yields, and negate impacts to watershed and floodplain resources. Proposed measures include:

- No surface disturbance would occur on slopes between 40 percent and 60 percent. If it is not feasible to avoid these slopes, then the applicant would provide the AO with an erosion control plan, a road maintenance plan, and an engineered drawing of the proposed road. Approval from the AO would be required for all proposed roads traversing slopes between 40 percent and 60 percent.
- Surface disturbance would be minimized on slopes between 21 and 40 percent.
- Well pads would not be located in active drainages.
- To the fullest extent possible, access roads proposed in valley/drainage bottoms would be sited on the toe of the adjacent slope to the valley bottom. Roads would have appropriate energy dissipaters (e.g., water bars and silt fences) where water leaves the road and is routed toward an adjacent drainage.
- Well pads adjacent to drainages would be bermed to prevent runoff from entering the drainage.
- As conditions dictate, and as determined by the AO, diversion ditches would be constructed around the pad.
- Where diversion ditches are constructed to reroute drainages around well pads, ditches would be designed to return the diverted water back to the original channel. If it is not feasible to return diverted water back to its original channel, the water would be diverted to the nearest channel, with energy-dissipating devices installed to prevent channel degradation.
- The presence of BSCs would be assessed on a site-specific basis during well pad and road development and siting. Areas with crusts would be avoided as feasible, and any unavoidable disturbance would be mitigated as necessary.
- Additional measures to ensure successful reclamation would be implemented, as determined by the AO. They would consist of, but would not be limited to, hydro mulching, supplemental mycorrhizal applications, erosion blankets, spray-on fiber matrices, tackifiers, etc.
- Erosion and sedimentation would be reduced through the use of BMPs, including but not limited to berms, sediment control structures, grading, mulching, revegetation, and interim reclamation.
- Reclamation would be performed in accordance with the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a).

- All applicable surface stipulations from Appendix K and Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.
- If surface-disturbing activities cannot be avoided on slopes from 21 percent to 40 percent, a plan would be required. The plan would be approved by BLM prior to construction and maintenance and include: (i) an erosion control strategy, (ii) GIS modeling, and (iii) proper survey and design by a certified engineer.

4.5.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts from the Proposed Action include short- and long-term soil exposure and compaction, loss of soil productivity and topsoil due to erosion and disturbance of BSCs, increased susceptibility of soil to both wind and water erosion because of a loss of stabilizing vegetative cover, and increased sediment yield due to proposed oil and gas facilities and infrastructure.

Under the Proposed Action, an estimated 254 tons of sediment (above the natural background erosion) are expected to be eventually delivered to the area drainages annually over the long-term (production phase). Alternative B, Alternative C, and Alternative D would deliver an estimated 193, 254, and 251 tons of sediment, respectively. These sediment inputs would only slightly increase the approximately 6.8 million tons per year of sediment load in the Green River, estimated from USGS gage records of the Green River near Ouray, Utah.

4.5.4 Irretrievable and Irreversible Commitments of Resources

The activities proposed would result in short- and long-term changes to soil productivity due to surface disturbance and loss of vegetation. This loss of soil productivity would be irretrievable until restoration is complete. In some areas, soils restrict rehabilitation success. It is possible that soil in these areas would experience some irreversible impacts due to the difficulty in restoring vegetation.

4.5.5 Relationship of Short-Term Uses to Long-Term Productivity

Construction of oil and gas facilities and infrastructures would provide a short-term mineral use that would eventually result in long-term loss of soil productivity in localized areas impacted by development activities. Long-term impacts to soil productivity would be primarily the result of vegetation removal or prevention of revegetation that would allow continued erosion of soil. Impacts would persist until surface disturbance and vegetation loss are reclaimed.

4.6 WATER RESOURCES

4.6.1 Direct and Indirect Impacts

Potential direct and indirect impacts to surface water are:

- Depletion of water flow in the Green River due to project-related water consumption
- Water quality degradation by:
    - Increased sedimentation, turbidity, and salinity of MBPA streams as a result of additional surface disturbance and the resulting increased erosion into surface waters via runoff and the deposition of fugitive dust within streams and on rock surfaces

- Increased sediment loading to the Green River, potentially increasing salinity levels in the Colorado River system
- Potential contamination of surface water resources with drilling fluids, petroleum, produced water, or other chemicals used for drilling and production activities

- Erosion and sedimentation in the Waters of the U.S.

The potential for impacts would be greatest shortly after the start of construction activities and would decrease in time due to natural stabilization, reclamation, and revegetation efforts. The magnitude of these potential impacts to surface water resources would depend on several factors, including the proximity of the disturbed area to the water influence zone of ephemeral and perennial surface water drainages or ponds, slope aspect and gradient, the erosion potential of the affected soil types, the duration and timing of construction activities, and the success or failure of reclamation and mitigation measures. The water influence zone includes floodplains, zones of riparian vegetation, unstable areas, wetlands, or highly erodible soils located adjacent to a stream or other water body.

A Long-term Water Quality Monitoring Plan has been developed to monitor water resources before, during, and after development to detect impacts to surface and groundwater resources and to determine whether applicable water quality standards numeric and narrative criteria are being met. The proposed Long-term Water Quality Monitoring Plan is presented in **Appendix H**.

4.6.1.1 Alternative A – Proposed Action

4.6.1.1.1 Water Requirements

The project is divided into three different phases – well drilling and completion phase, production phase, and abandonment and reclamation phase. Each phase has its own water requirements, and each phase has water available from different sources.

4.6.1.1.1.1 Well Drilling and Completion Phase

About 0.9 acre-feet of water would be required to drill and complete each Green River oil well, and about 6.2 acre-feet would be required to drill and complete each deep gas well. The total water use for drilling and completion of all Green River oil wells (3,250 wells) and deep gas wells (2,500 wells) under the Proposed Action would be about 18,425 acre-feet, or approximately 1,150 acre-feet of water annually over the 16-year drilling and completion activities period.

In addition, a total of 0.08 acre-feet of water would be needed for dust suppression at each well pad, access road, and pipeline/utility corridor during construction activities. It is assumed that only 10 percent of the total wells drilled under the Proposed Action would require water for dust suppression during construction (575). It is further assumed that only 6.25 percent of this total amount would be needed on an annual basis during the 16-year construction period, which is a conservative assumption. Based on these assumptions, Newfield would need about three acre-feet per year for dust suppression during the well drilling and completion phase.

During the well drilling and completion phase, a total of 1,153 acre-feet of water would be needed annually for well drilling and completion (1,150 acre-feet/year) and dust suppression (3 acre-feet/year). It is assumed that necessary water would be acquired from permitted surface water before permitted groundwater sources. Thus, the entire available surface water supply (382 acre-feet/year) would be obtained from permitted surface water sources, and the remainder of the water needs (771 acre-feet/year) would be obtained from permitted groundwater sources.

4.6.1.1.1.2 Production Phase

It is assumed that about 0.13 acre-feet of water would be used annually for dust suppression per well pad, access road, and pipeline/utility corridor during the operation of the wells (5,750 wells), which would occur after well construction for 20 to 30 years. This water use applies to only 10 percent of the wells. Based on these assumptions, Newfield would use approximately 75 acre-feet of water annually for dust suppression and 1,500 to 2,250 acre-feet for the 20- to 30-year period of operation.

Water-flooding would be used at all of the proposed 40-acre spacing Green River wells (approximately 750 wells). A total of approximately 0.01 acre-feet of water would be used daily for each water-flood injection well. Based on an estimated requirement of about 7.5 acre-feet per day (750 wells times 0.01 acre-feet per day), the annual water requirement for water-flooding operations would be about 2,738 acre-feet. It is expected that about 50 percent of the water needed for flooding operations would come from recycled produced water, and the remaining 50 percent would come from fresh water resources.

The annual water requirement is the sum of the dust suppression (75 acre-feet/year) and water-flooding (2,738 acre-feet/year) water demands, or 2,813 acre-feet. It is assumed that recycled produced water would constitute 50 percent of water needed for production. If each of the 5,750 wells produces water (assuming 0.24 acre-feet of water can be recycled), then there would be 1,380 acre-feet of recycled water available to be used each year. The remainder of the water demand would be met by permitted surface water sources (382 acre-feet/year) and groundwater sources (about 1,051 acre-feet/year).

4.6.1.1.1.3 Abandonment and Reclamation Phase

During the abandonment and reclamation phase, 75 acre-feet per year would be needed for dust suppression. Because the wells would no longer be producing by this phase, this entire need would be met from permitted surface water sources. **Table 4.6.1.1.1.3-1** shows the water requirements and source of water for Alternative A.

TABLE 4.6.1.1.1.3-1
WATER REQUIREMENTS AND WATER AVAILABILITY UNDER ALTERNATIVE A – PROPOSED ACTION

Project Phase	Total Water Requirement (acre-feet/year)	Available Permitted Surface Water (acre-feet/year)	Available Permitted Groundwater (acre-feet/year)	Available Recycled Produced Water (acre-feet/year)	Recycled Produced Water Use (acre-feet/year)	Permitted Surface Water Use (acre-feet/year)	Permitted Groundwater Use (acre-feet/year)
Well Drilling and Completion (16 years)	1,153	382	12,236	0	0	382	771
Production (20-30 years)	2,813	382	12,236	1,380	1,380	382	1,051
Abandonment and Reclamation (5 years)	75	382	12,236	0	0	75	0

4.6.1.1.1.4 Surface Water Resources

Surface Water Use

Based on USGS records (USGS Site Numbers 09307000 and 09272400), the average flow in the Green River at Ouray is approximately 3,933,750 acre-feet per year (USGS 2012b). Assuming that the project's surface water needs are 382 acre-feet per year, as discussed in the previous section, the Proposed Action could potentially deplete the flow in the Green River by about 0.01 percent on an annual basis during the well drilling and completion phase and the production phase. During the abandonment and reclamation phase, the Proposed Action would deplete the Green River by about 0.002 percent per year. Because the Green River flow is heavily regulated by releases from the Flaming Gorge Reservoir, flow in the Green River does not vary from month to month as would an unregulated river, but there is still seasonal variation. The mean monthly flow varies from a low in January of 118,000 acre-feet to a high in June of 1,012,000 acre-feet. Assuming that the water demand is constant throughout the year, and factoring in a worst-case scenario because dust suppression is likely to be negligible during the winter, the water demand in January would be about 32 acre-feet of water. This would be about 0.027 percent of the flow in the Green River. Thus, the project-related flow depletion would be negligible from a hydrologic standpoint.

The USGS also has stream gages on Pariette Draw near its confluence with the Green River (Site Number 09307300) and about 7.5 miles upstream of the Green River (Site Number 09307200). Based on these records, the average annual flow in the Pariette Draw at the confluence is about 16,500 acre-feet per year. The flow also varies seasonally, with the lowest average monthly flow occurring in January (470 acre-feet) and the highest average monthly flow occurring in October (2,900 acre-feet). If the same assumptions made in the previous paragraph are applied, the Proposed Action could potentially deplete the flow in Pariette Draw by about 2.3 percent on an annual basis. It can be further assumed that, if the water demand is constant throughout the year and that all of the surface water flow is tributary to Pariette Draw, the water demand in January would be about 32 acre-feet of water, which would be about 6.8 percent of the flow in the Pariette Draw. In October, the water demand would be about 1.1 percent of the Pariette Draw flow. This is a minor percent of the total flow, but it may need to be mitigated by using groundwater to meet Project demands and to reduce any negative environmental impacts.

In addition, the stream gage measurements show that the flow in the upstream gage is actually greater than in the downstream gage, which implies that water from Pariette Draw is being diverted for other uses. The impact of the amount and location of the Project's water use would need to be analyzed to estimate its effect on downstream water users.

Floodplains

Under the Proposed Action, pipelines would cross ephemeral streams at approximately 953 locations within the MBPA. Because the pipelines would be buried in the floodplains, the Project would have no impact on the width of the floodplain or the water surface elevation for a given flood event. The water source well would have minimal impacts on the floodplain, even in the event of a 100-year flood, given that the well would be flush with the ground surface after construction, the drilling pad would be reclaimed, and there would be no storage of hydrocarbons in the floodplains.

Surface Water Quality

Accidental spillage of potentially toxic substances could potentially occur under the Proposed Action, due to loss of containment from tanks containing glycol, fracking fluids, or petroleum products. An accidental spill of such substances could potentially have a negative impact on receiving waters. Contamination could occur from two mechanisms: direct spills of materials into a creek, pond, or canal; and indirect contamination of surface water due to migration of petroleum from areas of soil contamination adjacent to surface water bodies. Sources of potential direct surface water contamination include pipeline leaks and tanker truck spills at stream crossings. Sources of potential indirect surface water contamination include leaks from wellheads, gathering pipelines, produced water and condensate storage tanks, and tanker trucks. The magnitude of these impacts would be largely dependent on the proximity of the spill to surface water features, the volume of material spilled, the permeability of the soils in the area, the ground slope between the spill site and the surface water feature, and the timing and intensity of rainfall or snowmelt.

Spills of petroleum products, fuels, and lubricants would have the highest potential to contaminate surface waters, especially if the spills were to occur when flow was present in the ephemeral drainages of the MBPA or if the spill occurred directly into a MBPA stream. Leaks of small amounts of petroleum on well pads are common occurrences; however, these small leaks generally affect relatively small areas. A traffic accident involving a tanker truck carrying condensate or produced water could lead to a larger release. Hwang et al. (2001) provided release probabilities for a variety of highway bulk containers. The probability of a release of a hazardous substance during an accident was found to range from 1.0 to 6.5 percent for different container types. Therefore, using the release probabilities reported, between two and 10 significant releases of condensate or produced water from a tanker truck could be expected to occur in the MBPA during the LOP.

Specific actions under the Proposed Action could reduce or minimize impacts to surface waters related to accidental spills or loss of containment. Specifically, actions identified in the required SPCC Plans for each well site would be implemented to minimize the chance that petroleum products and other chemicals would leave the site and contaminate surface waters. If any spills were to occur, the operator would immediately contact the BLM and any other regulatory agencies as required by law or regulation. Strict cleanup efforts would be initiated within 24 hours.

Hydrofracturing would be conducted as part of the alternatives. Hydrofracturing is commonly used to enhance the recovery of natural gas from relatively impermeable "tight" sandstones and involves the injection of water or other fluids, which may contain some petroleum constituents, and sand or some other "proppant" into the formation. Hydrofracturing would occur at depths that are at least 4,500 feet or more below the surface; therefore, the potential for impacts to surface water resources from the proposed hydrofracturing is considered to be negligible.

The Lower Duchesne River Wetlands Mitigation Project lies approximately 2 miles north of the MBPA and is approximately 4,800 acres in size. Because of the small amount of water that would be used by the project and the large distance between the MBPA and the Lower Duchesne River Wetlands Mitigation Project, the proposed Project would have a negligible effect on the water quality or quantity at the Wetlands Mitigation Project.

The Sand Wash Recreation Area lies approximately 9 miles south of the planning area. Because of the small amount of water used by the project and the large distance between the MBPA and the Lower Sand Wash Recreation Area, the Project would have a negligible effect on the water quality or quantity at the Sand Wash Recreation Area.

Total Maximum Daily Load Constituents of Concern

Because selenium, boron, and salts (TDS) are found in the soil and attach themselves to soil particles, additional eroded material resulting from the Proposed Action that is conveyed to Pariette Draw would contain these constituents of concern and would increase their concentration slightly in Pariette Draw.

Sediment, Turbidity, and Temperature

Increased erosion and subsequent increased sedimentation of perennial streams and ephemeral drainages within the MBPA is possible, especially during the construction of the project facilities. The increased erosion could also potentially lead to an increase in turbidity and salinity in Pariette Draw, Gilsonite Draw, and Wells Draw, which could possibly be continued to be conveyed down to the Green River. Both of these effects could have negative impacts on aquatic habitat within affected drainages. In sufficient amounts, the eroded material from construction activities and operational facilities could:

- Degrade aquatic habitat by covering stream substrates with fine sediment and clogging the interstitial pores of the substrate.
- Increase the turbidity within MBPA streams and the Green River.
- Clog road culverts, which would cause runoff to flow down roads, causing more erosion and road damage.
- Transport pollutants (trace metals, herbicides, petroleum constituents, and constituents of enhanced dust suppressants).
- Increase deposits in channels with subsequent decrease in the longitudinal slope and the flow carrying capacity of Pariette Draw and its tributaries, which could lead to higher water levels during flood events and more frequent flood events.
- Increase salinity levels in the Green River (Colorado River system).

Note: Erosion is the amount of soil that is mobilized due to wind or rain, and it is discussed fully in **Section 4.5**. The amount of sediment that could potentially reach the drainages in the MBPA depends on natural factors and the effectiveness of the erosion control measures employed. Natural factors which attenuate the transport of sediment into creeks include water available for overland flow; the texture of the eroded material; the amount and kind of ground cover; the slope shape, gradient, and length; and surface roughness (Barfield et al. 1981).

The erosion control measures employed would be of two types: non-structural controls and structural controls. Non-structural controls include proper clearing, grading, and construction practices, including surface roughening and crowning and ditching of roadways. Structural controls would be used along the proposed access roads, at drilling locations, and at other project facilities to minimize the amount of sediment that reaches any ephemeral drainage in the MBPA, where needed. The structural controls used would be specified during the APD process for each project facility.

It is assumed that the sediment load that enters the drainage ways is derived from three sources – unpaved road stream crossings, sediment eroded from disturbed areas such as well pads and associated facilities, such as buried pipelines, and general watershed erosion. The WEPP:Road computer program was used to estimate the amount of sediment entering streams at road crossings (USDA 2012). Climate information from Altamont, Utah, was used to estimate sediment yield. The roads are assumed to be in-sloped with a bare ditch and erosion was assumed to occur for a distance of 300 feet in each direction of the stream crossing. During the construction and development phase of the project, the roads are assumed to have

"Low" use, while during the production phase the dirt roads are assumed to have "No" use. The study area contains four different soil textures (clay loam, loam, sandy loam, and silt loam), and typical sediment yield estimates were obtained from a sample of sites in areas with a common soil texture. The road slope and road width were measured at these sample sites, and sediment yield quantities were estimated at each location. The sediment yield estimates for a typical road crossing were then averaged for each soil texture classification. This average sediment yield was then multiplied by the total number of road crossings in each soil texture area and each watershed to get the total estimate sediment yield in each watershed.

Data such as precipitation, soil type, topography, land cover, and BMPs were used to estimate sediment yield using the RUSLE2 model. **Appendix F** describes the RUSLE2 model, as well as the assumptions and methods used to estimate the additional erosion that would be generated by the implementation of the Proposed Action and alternatives.

As previously discussed, the study area contains four different soil textures (clay loam, loam, sandy loam, and silt loam), and sediment yield was estimated from a typical well pad within each area with a common soil texture. This average sediment yield was then multiplied by the total number of well pads, expanded well pads in each soil texture area, and each watershed to calculate the total estimate sediment yield in each watershed.

To estimate general erosion from the study area, sediment yield coefficients were obtained from a literature search, and sediment yield coefficients were selected for each combination of soil erodibility (low, medium, and high) and land cover (pinyon-juniper woodland, riparian, sagebrush, desert shrub, and badlands). The sediment yield coefficients (tons/square mile/year) were then multiplied by the area of the soil erodibility and land cover areas to estimate a sediment delivery rate for each watershed.

It is assumed that no erosion and sediment control BMPs are placed on the roads at the stream crossings. While there would be erosion from roads away from the stream crossings (as discussed in **Section 4.5**), the eroded material would be retained in the buffer between the road and stream, so there is no sediment delivery to the stream.

Table 4.6.1.1.1.4-1 shows the estimated sediment yield in the watersheds for existing conditions. **Tables 4.6.1.1.1.4-2** and **4.6.1.1.1.4-3** provide sediment yield estimates in the watersheds during the construction and development phase and the production phase under Alternative A, respectively. **Table 4.6.1.1.1.4-4** summarizes the sediment yield produced for existing conditions and during each project phase.

TABLE 4.6.1.1.1.4-1
SEDIMENT YIELD UNDER EXISTING CONDITIONS

Sediment Source	Antelope Creek Watershed (tons/year)	Upper Pariette Draw Watershed (tons/year)	Sheep Wash - Green River Watershed (tons/year)	Lower Pariette Draw Watershed (tons/year)	Total Study Area (tons/year)
Stream Crossings	0	14.9	1.9	8.2	24.9
Well Pads and Facilities	0	0	0	0	0

Sediment Source	Antelope Creek Watershed (tons/year)	Upper Pariette Draw Watershed (tons/year)	Sheep Wash - Green River Watershed (tons/year)	Lower Pariette Draw Watershed (tons/year)	Total Study Area (tons/year)
General Erosion	189	59,479	22,827	122,237	204,732
Total	189	59,494	22,829	122,245	204,764

Source Note: Summations may not total precisely due to rounding.

TABLE 4.6.1.1.1.4-2
SEDIMENT YIELD DURING WELL DRILLING AND COMPLETION PHASE UNDER ALTERNATIVE A – PROPOSED ACTION

Sediment Source	Antelope Creek Watershed (tons/year)	Upper Pariette Draw Watershed (tons/year)	Sheep Wash - Green River Watershed (tons/year)	Lower Pariette Draw Watershed (tons/year)	Total Study Area (tons/year)
Stream Crossings	0	36.3	6.1	19.8	62.2
Well Pads and Facilities	0	.004	.002	.008	.013
General Erosion	189	59,479	22,827	122,237	204,734
Total	189	59,515	22,833	122,257	204,796

Source Note: Summations may not total precisely due to rounding.

TABLE 4.6.1.1.1.4-3
SEDIMENT YIELD DURING PRODUCTION PHASE UNDER ALTERNATIVE A – PROPOSED ACTION

Sediment Source	Antelope Creek Watershed (tons/year)	Upper Pariette Draw Watershed (tons/year)	Sheep Wash - Green River Watershed (tons/year)	Lower Pariette Draw Watershed (tons/year)	Total Study Area (tons/year)
Stream Crossings	0	18.9	3.3	9.9	32.1
Well Pads and Facilities	0	0	0	0	0
General Erosion	189	59,479	22,827	122,237	204,732
Total	189	59,498	22,830	122,247	204,764

Source Note: Summations may not total precisely due to rounding.

TABLE 4.6.1.1.1.4-4
TOTAL SEDIMENT YIELD COMPARISON
UNDER ALTERNATIVE A – PROPOSED ACTION

Sediment Source	Existing Conditions (tons/year)	Well Drilling and Completion Phase (tons/year)	Production Phase (tons/year)
Stream Crossings	24.9	62.2	32.1
Well Pads and Facilities	0	.013	0
General Erosion	204,732	204,732	204,732
Total	204,757	204,794	204,764
Increase Over Existing Conditions	-	37	7
Percent Increase Over Existing Conditions	-	<0.1%	<0.1%

Source Note: Summations may not total precisely due to rounding.

Based on data collected at the USGS gaging stations, annual sediment loading in the Green River at Ouray, Utah, is about 6,789,000 tons. The highest sediment loading occurs during the months of May and June from snowmelt runoff. Assuming that all sediment from the construction of the project facilities would eventually be transported to the Green River, the increased sediment loading to the Green River would be less than 0.1 percent during the well drilling and completion phase and the production phase. The actual amount of sediment that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. Because of the close relationship between salinity and sediment, it is anticipated that salinity levels in the Green River would increase by a similar percentage.

It is important to note that these calculations are approximate. The actual amount of additional sediment loading to MBPA drainages and the Green River is dependent on the natural factors listed above, precipitation amounts and timing, channel conditions, BMP efficiency, and reclamation success or failure. In addition, the erosion calculations are also approximate. Nonetheless, these estimates provide a useful way to compare the potential impacts of the various alternatives against each other, in addition to providing estimates of the increased sediment delivery to MBPA drainages and the Green River.

Water from Pariette Draw is also diverted into the Pariette Wetland ponds, so the Project could slightly increase the sediment load into the first pond. Because the flow velocity through the first pond is close to zero, suspended sediment could potentially settle out in the first pond and would not be conveyed to subsequent ponds. The increased load to the first pond would have a negligible effect on the pond over the LOP.

In addition to the direct erosion of soil surfaces described above, increased traffic levels associated with the Proposed Action would increase the amount of dust generated in the MBPA. Deposition of fugitive dust on vegetation and rock surfaces and directly in stream channels has the potential to slightly increase turbidity levels within the perennial creeks in the MBPA. The amount of potential turbidity increase through this mechanism cannot be quantified, but is expected to be small when compared to the amount of increased turbidity that would potentially result from the increased erosion of soils.

Because the Proposed Action would have a negligible effect on flow in the Green River, it would not affect erosion rates along the river banks or change the distribution of sediment within the river. If surface water is withdrawn from Pariette Draw and its tributaries, the effect would be minor and would actually reduce streambank erosion. Sediment deposition or erosion within the channels would depend on many factors, but it would be expected that if erosion is increased and flow is decreased, there would be some deposition in the channel bottoms.

New graveled roads and well pads could contribute greater runoff than undisturbed sites. If there was increased runoff, it would lead to slightly higher peak flows that could potentially increase erosion of roadside ditches and channel banks. The increased erosion could also potentially raise turbidity and salinity in streams during storm events.

One freshwater collection well would be constructed within the floodplain of the Green River. Construction of the collection well would disturb about 0.2 acres on the floodplain. A temporary increase in erosion and sedimentation in the Green River could occur during construction of this well. However, given the small amount of disturbance and the proposed construction timing occurring during the winter months, the increased sedimentation to the Green River would be negligible.

Because of the small percentage of additional sediment under the Proposed Action, it would have a negligible effect on the temperature of the water in Pariette Draw or its tributaries or in the Green River.

The Proposed Action should have negligible impacts to secondary beneficial uses such as boating, wading, or similar uses; cold water species of game fish and other cold water aquatic life; and agricultural uses including irrigation of crops and stock watering. It is not expected that the small increase in sediment load would significantly impact boating, wading, or other similar uses in Pariette Draw and the Green River. Similarly, it is not expected that the increase in sediment load would affect the temperature in Pariette Draw or the Green River so that it could affect cold water aquatic species, or that the increase in sediment load would negatively impact the water quality for agricultural uses.

4.6.1.1.1.5 Groundwater Resources

The risk of potential direct and indirect impacts to groundwater sources that could arise during drilling activities, production, hydraulic fracturing, and disposal of produced water are discussed below. These risks include:

- Risk of contamination of shallow fresh water resources during drilling from release of drilling mud to aquifer;
- Risk of contamination of shallow fresh water resources during drilling from exposure to deeper saline groundwater;
- Risk of contamination of shallow fresh water resources from leaks from reserve pits;
- Risk of contamination of shallow fresh water resources from hydraulic fracturing operations from discharge of fracturing fluid; and
- Risk of contamination of shallow fresh water resources from fracturing operations from cross-connection of shallow fresh water aquifers and deeper saline aquifers containing hydrocarbons.

Groundwater Depletion

Groundwater exists in shallow unconsolidated alluvium along Pariette Draw, Gilsonite Draw, and Wells Draw, along the lower portions of the larger ephemeral washes, and in deeper bedrock formations beneath the MBPA. However, because of limited development and the great depth to the bedrock aquifers, only a few water wells are located within the MBPA.

Only existing permitted groundwater sources would be used for drilling, completion, or production activities related to this project. While some of this groundwater would be injected back into the groundwater, these activities would result in permanent withdrawals of groundwater (produced formation water). Under the Proposed Action, groundwater withdrawal would result in total aquifer drawdown of approximately 43,866 acre-feet over a 41- to 51-year LOP, or about 860 acre-feet per year. (See **Table 4.6.1.1.1.5-1.**) Assuming no recharge, this represents a 0.14 percent decrease in the estimated 31 million acre-feet of water stored in aquifers in the Uinta Basin (UDWaR 1999), which would have a negligible impact on the quantity of groundwater in the area (see **Table 4.6.1.1.1.5-1**). Locally, these withdrawals may lower the water table, which could reduce the water supply available for domestic users and could reduce flow into streams and springs.

TABLE 4.6.1.1.1.5-1
GROUNDWATER USE IN UINTA BASIN AQUIFERS

Groundwater Use	Alternative A (Proposed Action)	Alternative B (No Action)	Alternative C (Field-wide Electrification)	Alternative D (Agency Preferred Alternative)
Net Groundwater Withdrawal (acre-feet) over the LOP	43,866	0	44,226	42,664
Percent decrease in water stored in Uinta Basin aquifers	0.14%	0%	0.14%	0.14%

Groundwater Quality

Deep or Confined Aquifers

Potential direct and indirect impacts to usable groundwater sources under the Proposed Action would be effectively eliminated, reduced, or mitigated through the application of required and standard stipulations and lease notices and through the guidance, regulations, BLM Onshore Oil and Gas Orders, and standard COAs discussed below.

The MBPA does not overlie a Sole Source Aquifer (SSA) or a Utah Drinking Water Source Protection Zone (DWSPZ). On federal leases, usable groundwater resources are protected during drilling in accordance with BLM Onshore Oil and Gas Order No. 2, which requires that all formations containing usable quality water (≤10,000 mg/L total dissolved solids) be isolated and protected using cement in the wells.

Per BLM standard practice, a site-specific analysis of groundwater and groundwater protection would be conducted during BLM's review of an APD, using the Utah groundwater protection IM No. UT 2010-055.

A BLM geologist and/or hydrologist would perform an independent review of each APD, using UGS and USGS geologic and hydrologic data and maps to generate a geologic report. The geologist and/or hydrologist would identify usable groundwater and mineral-bearing zones that require protection. A petroleum engineer would review the casing and cementing portions of the drilling plan to ensure the protection of those zones identified by the geologic report. A natural resource specialist (NRS) would review the surface use plan and determine the adequacy of reserve pit design. COAs would be attached to the APD as necessary.

Operators are encouraged to substitute less toxic substances, yet equally effective chemicals, for conventional drilling products such as mud and pipe dope. To prevent contamination of groundwater and soils, or to conserve water, the BLM suggests that operators use a closed-loop drilling system or line reserve pits with an impermeable liner if pits are constructed in areas of shallow groundwater or in porous soils over fractured bedrock. If the AO determines it is necessary, as verified during the onsite or permit review, the BLM would make this a requirement by attaching a COA at the time of APD approval. The BLM has the authority to require companies to do reasonable testing of groundwater quality and quantity during drilling, if deemed necessary, in accordance with 43 CFR 3162.4-2.

Groundwater zones would be protected by cementing the surface casing to the ground surface and by bringing the cement for the production or intermediate casing to at least 200 feet above the surface casing shoe. The annular space between the borehole and the casings would be sealed with cement for the entire length of the surface casings to isolate any underground sources of drinking water. A cement bond log would be run to ensure that the seal is adequate. As necessary, a COA would be attached to the APD. The COA would specify the anticipated formation and depth where usable quality water might be encountered. Petroleum engineering technicians would inspect well sites during drilling, completion, and production for technical and safety compliance.

BLM Onshore Oil and Gas Order No. 7, Disposal of Produced Water (43 CFR 3162.5 – Environment and Safety) specifies the information and procedures required to submit an application for the disposal of produced water, as well as the design, construction, and maintenance requirements for disposal pits. All produced water from federal leases must be disposed of as follows: 1) by injection into the subsurface, which is regulated by the EPA or UDOGM within the UIC programs; 2) into pits, which is regulated by BLM or UDOGM; or 3) by other acceptable methods approved by the AO, including surface discharge under the National Pollutant Discharge Elimination System (NPDES) as regulated by UDEQ. Injection of produced water on federal lands in Utah is regulated by Utah Administrative Rule R649-5: Underground Injection Control of Recovery Operations and Class II Injection Wells. Injection of produced water on Indian lands in Utah is administered by the EPA under 40 CFR 17.2253.

As discussed above, the potential risks of hydraulic fracturing to ground water resources include the following:

- Risk of contamination of shallow fresh water resources from hydraulic fracturing operations from discharge of fracturing fluid; and

- Risk of contamination of shallow fresh water resources from fracturing operations from cross-connection of shallow fresh water aquifers and deeper saline aquifers containing hydrocarbons.

However, if wells are properly completed, as previously discussed, there should be sufficient distance between the zones that are hydraulically fractured and the aquifers with usable water that the aquifers should not be affected by hydraulic fracturing. At the request of Congress, the EPA is conducting a study to better understand any potential impacts of hydraulic fracturing for oil and gas on ground water and drinking water resources. Information on the study can be found at http://www2.epa.gov/hfstudy.

Shallow or Alluvial Aquifers

Spills or leaks of fuels, lubricants, natural gas condensate, produced water, or other chemicals from well pads and pipelines have the potential to contaminate groundwater resources, especially the shallow alluvial groundwater. Containment structures would be constructed around all tank batteries and would be consistent with EPA's SPCC regulations. All spills or leakages must be reported immediately by the operator to the BLM in accordance with Notice to Lessees NTL-3A.

A spill of natural gas condensate from a tanker truck directly into surface water drainage would have the greatest potential to contaminate groundwater. As discussed above for surface water, approximately two to 10 spills from a tanker truck could be expected to occur over the LOP on MBPA roads. Therefore, the probability of a spill occurring directly into a drainage is less than one event over the LOP. If a spill is detected, the SPCC Plan would be implemented to minimize, control, and cleanup the affected area. The measures provided in the SPCC Plan would minimize the chance that spilled material enters a surface water feature and subsequently impacts shallow groundwater by providing a rapid response to any spill events.

Any shallow groundwater zones encountered during drilling of the proposed wells would be properly protected and the presence of these water-bearing zones reported to the appropriate agencies. All hydrocarbon-producing zones would be cemented off and tested. After the completion of drilling operations, the producing formation would be logged and the production casing run and cemented in accordance with the drilling program approved in the APD. The casing and cementing program would be designed to isolate and protect the shallower formations encountered in the wellbore and to prohibit pressure communication or fluid migration between different formations. In addition, the cement would protect the well by preventing formation pressure from damaging the casing and by retarding corrosion by minimizing contact between the casing and formation. These measures would isolate all water-bearing formations in the borehole and would effectively eliminate communication between hydrocarbon-bearing zones and the shallow groundwater aquifers.

Because reserve pit liners sometimes fail, an inspection program would be implemented, and repairs to the liner would be done quickly to prevent downward migration of contaminated water. If the liners remain intact, all contaminants would be contained within the reserve pits and immobilized by drying and burial. If liners were breached prior to pit closure and if groundwater were present in the area, soluble salts (sodium chloride [NaCl] and potassium chloride [KCl]), hydrocarbons, and metals could potentially migrate to groundwater. However, based on the success of similar liner use in reserve pits in the Uinta Basin, such leakage is considered to be unlikely, and if a leak were to occur, the potential that these contaminants would impact groundwater quality would be low. If these contaminants were to reach groundwater, impacts would likely be localized. In addition, the limited occurrence of shallow groundwater, the presence of fine-grained soils and sandstones, and the limited permeability of the aquifers in the MBPA would minimize migration of contaminants from a leaking reserve pit.

Springs

Potential impacts to springs from the Proposed Action include decreased flows and contamination by petroleum constituents. Springs located near wells or production facilities could potentially be contaminated by benzene of other petroleum constituents. Benzene and other constituents could potentially migrate along fracture systems to springs if proper completion and cementing procedures are not followed.

4.6.1.2 Alternative B – No Action Alternative

4.6.1.2.1 Water Requirements

4.6.1.2.1.1 Well Drilling and Completion Phase

About 0.9 acre-feet of water would be required to drill and complete each Green River oil well in the MBPA. The total water use for drilling and completion of all 788 wells under the No Action Alternative would be about 709 acre-feet, or approximately 322 acre-feet of water per year over the 2.2-year drilling and completion activities period.

Additionally, it is assumed that a total of 0.08 acre-feet would be needed for dust suppression at each well pad, access road, and pipeline/utility corridor during construction activities for the new 788 well pads. It is assumed that only 10 percent of the total wells drilled under the No Action Alternative would require water for dust suppression during construction (78). Assuming that construction would occur over a 2.2-year period, Newfield would need a total of about 6 acre-feet total, or 4 acre-feet annually for dust suppression during well construction and completion.

During the well drilling and completion phase, about 326 acre-feet per year is needed for well drilling and completion (322 acre-feet/year) and dust suppression (4 acre-feet/year). It is assumed that the necessary water would be acquired from permitted surface water before permitted groundwater sources. Thus, the entire annual requirement (326 acre-feet) would be obtained from permitted surface water sources.

4.6.1.2.1.2 Production Phase

It is assumed that about 0.13 acre-feet per well pad would be used annually for dust suppression at each well pad, access road, and pipeline/utility corridor during the operation of the wells, which would occur after well construction for 20 to 30 years. It is assumed that only 10 percent of the total wells drilled under the No Action Alternative would require water for dust suppression during construction (78). Based on these assumptions, Newfield would use approximately 10 acre-feet of water annually for dust suppression and 203- to 304-acre-feet for the 20- to 30-year period of operation.

Water-flooding would be used at approximately 150 well locations. Assuming approximately 0.01 acre-feet of water would be used daily for each water-flood injection well, the annual water requirement for water-flooding operations would be about 548 acre-feet. It is expected that about 50 percent of the water needed for flooding operations would come from recycled produced water.

During the production phase, 558 acre-feet per year is need for water-flooding (548 acre-feet/year) and dust suppression (10 acre-feet/year). It is assumed that recycled produced water would constitute 50 percent of water needed for production. If each of the 788 wells produces (assuming 0.24 acre-feet of water per well per year can be recycled), then approximately 189 acre-feet of produced water would be used to offset water depletions associated with the No Action Alternative. Therefore, under the No Action Alternative, the remaining 369 acre-feet per year would be obtained from permitted surface water sources (382 acre-feet available) and permitted groundwater sources.

4.6.1.2.1.3 Abandonment and Reclamation Phase

During the abandonment and reclamation phase, 10 acre-feet per year would be needed for dust suppression. Because the wells would no longer be producing under this phase, this entire need would be met from permitted surface water sources. **Table 4.6.1.2.1.3-1** shows the water requirements and source of water for Alternative B.

TABLE 4.6.1.2.1.3-1
WATER REQUIREMENTS AND WATER AVAILABILITY FOR ALTERNATIVE B – NO ACTION

Project Phase	Total Water Requirement (acre-feet/year)*	Available Permitted Surface Water (acre-feet/year)	Available Permitted Groundwater (acre-feet/year)	Available Recycled Produced Water (acre-feet/year)	Recycled Produced Water Use (acre-feet/year)	Permitted Surface Water Use (acre-feet/year)	Permitted Groundwater Use (acre-feet/year)
Well Drilling and Completion (2.2 years)	326	382	12,236	0	0	326	0
Production (20-30 years)	558	382	12,236	189	189	369	0
Abandonment and Reclamation (5 years)	10	382	12,236	0	0	10	0

*Summations between water use tables may be inconsistent due to rounding.

4.6.1.2.1.4 Surface Water Resources

Surface Water Use

During the well drilling and completion phase, surface water needs of 326 acre-feet per year for Alternative B could potentially deplete the flow in the Green River (3,933,750 acre-feet per year) by less than 0.01 percent. During the production phase, it is assumed that the water needs would be offset by recycled produced water; however, all 369 acre-feet per year of permitted surface water would be needed for the production phase. During the abandonment and reclamation phase, Alternative B would have a negligible effect on the Green River flow. Assuming a constant water demand throughout the year, the water demand in January (10 acre-feet) would be less than 0.01 percent of the flow in the Green River (118,000 acre-feet). Thus, the project-related flow depletion would be negligible from a hydrologic standpoint.

On an annual basis, Alternative B would use a maximum of 369 acre-feet per year and could potentially deplete the flow in Pariette Draw (16,500 acre-feet per year) by about 2 percent. The maximum water demand in January would be about 19 acre-feet of water, which would be about 4 percent of the flow in the Pariette Draw. In October, the water demand would be about 1 percent of the Pariette Draw flow. This is a minor percent of the total flow, but it may need to be mitigated by using groundwater to meet project demands and to reduce any negative environmental impacts.

Floodplains

Under Alternative B, pipelines would cross ephemeral streams at approximately 807 locations within the MBPA. Because the pipelines would be buried in the floodplains, the Project would have no impact on the width of the floodplain or the water surface elevation for a given flood event. The water source well would have minimal impacts on the floodplain, even in the event of a 100-year flood, given that the well would be flush with the ground surface after construction, the drilling pad would be reclaimed, and there would be no storage of hydrocarbons in the floodplains.

Surface Water Quality

Accidental spillage of potentially toxic substances could potentially occur under Alternative B, due to pipeline, wellhead, and storage tank leaks and tanker truck spills at stream crossings. The magnitude of these impacts would be largely dependent on the proximity of the spill to surface water features, the volume of material spilled, the permeability of the soils in the area, the ground slope between the spill site and the surface water feature, and the timing and intensity of rainfall or snowmelt.

If it is assumed that the number and quantity of spills is proportional to the number of wells drilled and operated, then Alternative B could potentially have about 14 percent (788/5,750) of the potential spillage that could occur under the Proposed Action. If the probability of a release of a hazardous substance during an accident is 1.0 to 6.5 percent, then between 0.3 and 1.4 significant releases of condensate or produced water from a tanker truck could be expected to occur in the MBPA during the LOP.

Specific actions under Alternative B could reduce or minimize impacts to surface waters related to accidental spills or loss of containment. Specifically, actions identified in the required SPCC Plans for each well site would be implemented to minimize the chance that petroleum products and other chemicals would leave the site and contaminate surface waters.

Hydrofracturing would occur at depths that are at least 4,500 feet or more below the surface; therefore, the potential for impacts to surface water resources from the proposed hydrofracturing is considered to be negligible.

Total Maximum Daily Load Constituents of Concern

Because selenium, boron, and salts (TDS) are found in the soil and attach themselves to soil particles, additional eroded material resulting from the proposed project that is conveyed to Pariette Draw would contain these constituents of concern and would increase their concentration slightly in Pariette Draw. However, increases would be less under Alternative B than under the Proposed Action.

Sediment, Turbidity, and Temperature

Increased erosion and subsequent increased sedimentation of perennial streams and ephemeral drainages within the MBPA is possible, especially during the construction of the project facilities. However, it would be less than what would be produced under Alternative A.

Tables 4.6.1.2.1.4-1 and **4.6.1.2.1.4-2** provide sediment yield estimates in the watersheds during the construction and development phase and the production phase under Alternative B, respectively. **Table 4.6.1.2.1.4-3** summarizes the sediment yield produced for existing conditions and during each project phase.

TABLE 4.6.1.2.1.4-1
SEDIMENT YIELD DURING WELL DRILLING AND COMPLETION PHASE UNDER ALTERNATIVE B – NO ACTION

Sediment Source	Antelope Creek Watershed (tons/year)	Lower Pariette Draw Watershed (tons/year)	Sheep Wash - Green River Watershed (tons/year)	Upper Pariette Draw Watershed (tons/year)	Total Study Area (tons/year)
Stream Crossings	0	31.1	3.5	18.0	52.6
Well Pads and Facilities	0	.001	0	.001	.002
General Erosion	189	59,479	22,827	122,237	204,732
Total	189	59,510	22,831	122,255	204,785

Source Note: Summations may not total precisely due to rounding.

TABLE 4.6.1.2.1.4-2
SEDIMENT YIELD DURING PRODUCTION PHASE UNDER ALTERNATIVE B – NO ACTION

Sediment Source	Antelope Creek Watershed (tons/year)	Lower Pariette Draw Watershed (tons/year)	Sheep Wash - Green River Watershed (tons/year)	Upper Pariette Draw Watershed (tons/year)	Total Study Area (tons/year)
Stream Crossings	0	15.8	2.0	8.8	26.6
Well Pads and Facilities	0	0	0	0	0
General Erosion	189	59,479	22,827	122,237	204,732
Total	189	59,495	22,829	122,246	204,759

Source Note: Summations may not total precisely due to rounding.

TABLE 4.6.1.2.1.4-3
TOTAL SEDIMENT YIELD COMPARISON UNDER ALTERNATIVE B – NO ACTION

Sediment Source	Existing Conditions (tons/year)	Well Drilling and Completion Phase (tons/year)	Production Phase (tons/year)
Stream Crossings	24.9	52.6	26.6
Well Pads and Facilities	0	.002	0
General Erosion	204,732	204,785	204,732
Total	204,757	204,781	204,759
Increase Over Existing Conditions	-	28	2
Percent Increase Over Existing Conditions	-	<0.1%	<0.1%

Source Note: Summations may not total precisely due to rounding.

Based on data collected at the USGS gaging stations, annual sediment loading in the Green River at Ouray, Utah, is about 6,789,000 tons. The highest sediment loading occurs during the months of May and June from snowmelt runoff. Assuming that all sediment from the construction of the project facilities would eventually be transported to the Green River, the increased sediment loading to the Green River would be less than 0.1 percent during the well drilling and completion phase and the production phase. The actual amount of sedimentation that would reach the drainages with the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. Because of the close relationship between salinity and sediment, it is anticipated that salinity levels in the Green River would increase by a similar percentage.

Water from Pariette Draw is also diverted into the Pariette Wetland ponds, so the Project could slightly increase the sediment load into the first pond. Because the flow velocity through the first pond is close to zero, suspended sediment would settle out in the first pond and would not be conveyed to subsequent ponds. The increased load to the first pond would have a negligible effect on the pond over the LOP.

The amount of potential turbidity increase through fugitive dust cannot be quantified, but it is expected to be small when compared to the amount of increased turbidity that would potentially result from the increased erosion of soils. New graveled roads and well pads could contribute greater runoff than undisturbed sites. If there was increased runoff, it would lead to slightly higher peak flows, potentially increasing erosion of roadside ditches and channel banks. The increased erosion could potentially raise turbidity and salinity in streams during storm events.

Because Alternative B would have a negligible effect on flow in the Green River, the alternative would not affect erosion rates along the river banks or change the distribution of sediment within the river. If surface water is withdrawn from Pariette Draw and its tributaries, the effect would be minor and would actually reduce streambank erosion. Sediment deposition or erosion within the channels would depend on many factors, but it would be expected that if erosion is increased and flow is decreased, there would be some deposition in the channel bottoms.

Because of the small percentage of additional sediment under Alternative B, it would have a negligible effect on the temperature of the water in Pariette Draw or its tributaries or in the Green River.

The alternative would have negligible impacts to secondary beneficial uses such as boating, wading, or similar uses; cold water species of game fish and other cold water aquatic life; and agricultural uses including irrigation of crops and stock watering. It is not expected that the small increase in sediment load would significantly impact boating, wading, or other similar uses in Pariette Draw and the Green River. Similarly, it is not expected that the increase in sediment load would affect the temperature in Pariette Draw or the Green River so that it could affect cold water aquatic species, or that the increase in sediment load would negatively impact the water quality for agricultural uses.

4.6.1.2.1.5 Groundwater Resources

Groundwater Depletion

Assuming that permitted surface water sources would be used before groundwater sources, no new groundwater would be used under this alternative.

Groundwater Quality

Deep or Confined Aquifers

Under Alternative B, potential direct and indirect impacts to usable groundwater sources would be effectively eliminated, reduced, or mitigated through the application of required and standard stipulations and lease notices and through the guidance, regulations, BLM Onshore Oil and Gas Orders, and standard COAs discussed below. These stipulations would be the same as would be implemented for the Proposed Action.

Shallow or Alluvial Aquifers

Under the No Action Alternative, potential direct and indirect impacts to shallow or alluvial groundwater sources would be effectively eliminated, reduced, or mitigated through the same measures as would be implemented for the Proposed Action

The potential for contaminating shallow or alluvial aquifers under Alternative B is thought to be less than what would be expected for Alternative A, because there are fewer wells under Alternative B.

Springs

Under Alternative B, the potential impacts to springs are the same as what would be expected for the Proposed Action. However, because there are fewer wells under Alternative B, the risk of contamination to springs is less.

4.6.1.3 Alternative C – Field-Wide Electrification

4.6.1.3.1 Water Requirements

4.6.1.3.1.1 Well Drilling and Completion Phase

Water requirements under this phase would be the same as under the Proposed Action. Approximately 0.9 acre-feet of water would be required to drill and complete each Green River oil well, and about 6.2 acre-feet would be required to drill and complete each deep gas well. The total water use for drilling and completion of all Green River oil wells (3,250 wells) and deep gas wells (2,500 wells) under Alternative C would be approximately 18,425 acre-feet, or approximately 1,150 acre-feet of water annually over the 16-year drilling and completion activities period.

In addition, a total of 0.08 acre-feet of water would be needed for dust suppression at each well pad, access road, and pipeline/utility corridors during construction activities for the new well pads (5,750 wells). It is assumed that only 10 percent of the total wells drilled under the Proposed Action would require water for dust suppression during construction (575). Newfield would need a total of about 46 acre-feet for dust suppression during well construction and completion, or about 3 acre-feet per year over the 16-year drilling and completion activities period.

During the well drilling and completion phase, the annual water demand would be approximately 1,153 acre-feet for the 16-year drilling and completion activities period. It is assumed that necessary water would be acquired from permitted surface water before permitted groundwater sources. The available permitted surface water sources total about 382 acre-feet per year, so the remainder (771 acre-feet/year) would be obtained from permitted groundwater sources.

4.6.1.3.1.2 Production Phase

Water requirements under this phase would be the same as under the Proposed Action. It is assumed that approximately 0.13 acre-feet of water would be used annually for dust suppression at each well pad, access road, and pipeline/utility corridor during the operation of the wells, which would occur after well construction for 20 to 30 years. This water use applies to only 10 percent of the wells. Based on these assumptions, Newfield would use approximately 75 acre-feet of water annually for dust suppression and 1,500- to 2,250-acre-feet for the 20- to 30-year period of operation.

Water-flooding would be used at all of the proposed 40-acre spacing Green River wells (approximately 750 wells). Assuming approximately 0.01 acre-feet of water would be used daily for each water-flood injection well, the annual water requirement for water-flooding operations would be about 2,738 acre-feet. It is expected that about 50 percent of the water needed for flooding operations would come from recycled produced water, and the other 50 percent would come from freshwater sources.

The annual water requirement is the sum of the dust suppression (75 acre-feet/year) and water-flooding water demands (2,738 acre-feet/year), or 2,813 acre-feet. It is assumed that recycled produced water would constitute 50 percent of water needed for production. If each of the 5,750 wells produces (assuming 0.24 acre-feet of water can be recycled), then there would be 1,380 acre-feet of recycled water available to be used each year. The remainder of the water demand would be met by permitted surface water sources (382 acre-feet/year) and permitted groundwater sources (about 1,051 acre-feet/year).

4.6.1.3.1.3 Abandonment and Reclamation Phase

During the abandonment and reclamation phase, the well pads and appurtenant facilities would still need dust suppression, so the annual water demand would be 75 acre-feet. Because the wells are no longer producing, this entire demand would be met from permitted surface water sources. **Table 4.6.1.3.1.3-1** shows the water requirements and source of water for Alternative C.

TABLE 4.6.1.3.1.3-1
WATER REQUIREMENTS AND WATER AVAILABILITY
FOR ALTERNATIVE C – FIELD-WIDE ELECTRIFICATION

Project Phase	Total Water Requirement (acre-feet/year)	Available Permitted Surface Water (acre-feet/year)	Available Permitted Groundwater (acre-feet/year)	Available Recycled Produced Water (acre-feet/year)	Recycled Produced Water Use (acre-feet/year)	Permitted Surface Water Use (acre-feet/year)	Permitted Groundwater Use (acre-feet/year)
Well Drilling and Completion (16 years)	1,153	382	12,236	0	0	382	771
Production (20-30 years)	2,813	382	12,236	1,380	1,380	382	1,051
Abandonment and Reclamation (5 years)	75	382	12,236	0	0	75	0

4.6.1.3.1.4 Surface Water Resources

<u>Surface Water Use</u>

During the well drilling and completion phase, surface water needs of 382 acre-feet per year for Alternative C could potentially deplete the flow in the Green River (3,933,750 acre-feet per year) by less than 0.01 percent. During the Production Phase, its surface water needs would be identical to those during the well drilling and completion because both require the maximum permitted amount. During the Abandonment and Reclamation Phase, Alternative C would require 75 acre-feet per year and would have a negligible effect on the Green River flow. Assuming a constant water demand throughout the year, the monthly water demand (32 acre-feet) would be about 0.03 percent of the flow in the Green River in January (118,000 acre-feet). Thus, the project-related flow depletion would be negligible from a hydrologic standpoint.

On an annual basis, Alternative C would use a maximum of 382 acre-feet per year and could potentially deplete the flow in Pariette Draw (16,500 acre-feet per year) by about 2.3 percent. Assuming a constant water demand, the monthly water demand would be about 32 acre-feet of water, which would be about 6.8 percent of the January flow in Pariette Draw (470 acre-feet). In October, the water demand would be about 1.6 percent of the Pariette Draw flow (2,900 acre-feet). This is a minor percent of the total flow, but it may need to be mitigated by using groundwater to meet project demands.

<u>Floodplains</u>

Under Alternative C, pipelines would cross ephemeral streams at approximately 953 locations within the MBPA. Because the pipelines would be buried in the floodplains, the Project would have no impact on the width of the floodplain or the water surface elevation for a given flood event. The water source well would have minimal impacts on the floodplain, even in the event of a 100-year flood, given that the well would be flush with the ground surface after construction, the drilling pad would be reclaimed, and there would be no storage of hydrocarbons in the floodplains.

Surface Water Quality

Accidental spillage of potentially toxic substances could potentially occur under Alternative C, due to pipeline, wellhead, and storage tank leaks and tanker truck spills at stream crossings. The magnitude of these impacts would be largely dependent on the proximity of the spill to surface water features, the volume of material spilled, the permeability of the soils in the area, the ground slope between the spill site and the surface water feature, and the timing and intensity of rainfall or snowmelt.

If the number and quantity of spills is proportional to the number of wells drilled and operated, then Alternative C would potentially have the same potential spillage risk as that under the Proposed Action.

Specific actions under Alternative C could reduce or minimize impacts to surface waters related to accidental spills or loss of containment. Specifically, actions identified in the required SPCC Plans for each well site would be implemented to minimize the chance that petroleum products and other chemicals would leave the site and contaminate surface waters.

Hydrofracturing would occur at depths of at least 4,500 feet or more below the surface; therefore, the potential for impacts to surface water resources from the proposed hydrofracturing is considered to be negligible.

Total Maximum Daily Load Constituents of Concern

Alternative C could have some effect on the TMDL constituents of concern. Because these constituents are found in the soil and attach themselves to soil particles, additional eroded material resulting from the proposed Project that is conveyed to Pariette Draw would contain these constituents of concern and would increase their concentration slightly in Pariette Draw.

Sediment, Turbidity, and Temperature

Increased erosion and subsequent increased sedimentation of perennial streams and ephemeral drainages within the MBPA is possible, especially during the construction of the project facilities. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion.

Tables 4.6.1.3.1.4-1 and **4.6.1.3.1.4-2** provide sediment yield estimates in the watersheds during the construction and development phase and the production phase under Alternative C, respectively. **Table 4.6.1.3.1.4-3** summarizes the sediment yield produced for existing conditions and during each project phase.

TABLE 4.6.1.3.1.4-1
SEDIMENT YIELD DURING WELL DRILLING AND COMPLETION PHASE UNDER ALTERNATIVE C – FIELD-WIDE ELECTRIFICATION

Sediment Source	Antelope Creek Watershed (tons/year)	Upper Pariette Draw Watershed (tons/year)	Sheep Wash - Green River Watershed (tons/year)	Lower Pariette Draw Watershed (tons/year)	Total Study Area (tons/year)
Stream Crossings	0	36.3	6.1	19.8	62.2
Well Pads and Facilities	0	.004	.002	.008	.013
General Erosion	189	59,479	22,827	122,237	204,732
Total	189	59,515	22,833	122,257	204,794

Source Note: Summations may not total precisely due to rounding.

TABLE 4.6.1.3.1.4-2
SEDIMENT YIELD DURING PRODUCTION PHASE UNDER ALTERNATIVE C – FIELD-WIDE ELECTRIFICATION

Sediment Source	Antelope Creek Watershed (tons/year)	Upper Pariette Draw Watershed (tons/year)	Sheep Wash - Green River Watershed (tons/year)	Lower Pariette Draw Watershed (tons/year)	Total Study Area (tons/year)
Stream Crossings	0	18.9	3.3	9.9	32.1
Well Pads and Facilities	0	0	0	0	0
General Erosion	189	59,479	22,827	122,237	204,732
Total	189	59,498	22,830	122,247	204,764

Source Note: Summations may not total precisely due to rounding.

TABLE 4.6.1.3.1.4-3
TOTAL SEDIMENT YIELD COMPARISON
UNDER ALTERNATIVE C – FIELD-WIDE ELECTRIFICATION

Sediment Source	Existing Conditions (tons/year)	Well Drilling and Completion Phase (tons/year)	Production Phase (tons/year)
Stream Crossings	24.9	62.2	32.1
Well Pads and Facilities	0	.013	0
General Erosion	204,732	204,732	204,732
Total	204,757	204,794	204,764
Increase Over Existing Conditions	-	37	7
Percent Increase Over Existing Conditions	-	<0.1%	<0.1%

Source Note: Summations may not total precisely due to rounding.

Based on data collected at the USGS gaging stations, annual sediment loading in the Green River at Ouray, Utah, is about 6,789,000 tons. The highest sediment loading occurs during the months of May and June from snowmelt runoff. If it is assumed that all sediment from the construction of the project facilities would eventually be transported to the Green River, the increased sediment loading to the Green River would be less than 0.1 percent during the well drilling and completion phase and the production phase. Because of the close relationship between salinity and sediment, it is anticipated that salinity levels in the Green River would increase by a similar percentage.

Water from Pariette Draw is also diverted into the Pariette Wetland ponds, so the project could slightly increase the sediment load into the first pond. Because the flow velocity through the first pond is close to zero, suspended sediment would settle out in the first pond and would not be conveyed to subsequent ponds. The increased load to the first pond should have a negligible effect on the pond over the LOP.

The amount of potential turbidity increase through fugitive dust cannot be quantified, but it is expected to be small when compared to the amount of increased turbidity that would potentially result from the increased erosion of soils. New graveled roads and well pads could contribute greater runoff than undisturbed sites. If there is increased runoff, it would lead to slightly higher peak flows, potentially increasing erosion of roadside ditches and channel banks. The increased erosion could potentially raise turbidity and salinity in streams during storm events.

Because Alternative C would have a negligible effect on flow in the Green River, the alternative would not affect erosion rates along the river banks or change the distribution of sediment within the river. If surface water is withdrawn from Pariette Draw and its tributaries, the effect would be minor and would actually reduce streambank erosion. Sediment deposition or erosion within the channels would depend on many factors, but it would be expected that if the sediment load is increased and flow is decreased, there would be some deposition in the channel bottoms.

Because of the small percentage of additional sediment under Alternative C, it would have a negligible effect on the temperature of the water in Pariette Draw or its tributaries or in the Green River.

The alternative would have negligible impacts to secondary beneficial uses such as boating, wading, or similar uses; cold water species of game fish and other cold water aquatic life; and agricultural uses including irrigation of crops and stock watering. It is not expected that the small increase in sediment load would significantly impact boating, wading, or other similar uses in Pariette Draw and the Green River. Similarly, it is not expected that the increase in sediment load would affect the temperature in Pariette Draw or the Green River so that it could affect cold water aquatic species, or that the increase in sediment load would negatively impact the water quality for agricultural uses.

4.6.1.3.1.5 Groundwater Resources

Groundwater Depletion

Groundwater exists in shallow unconsolidated alluvium along Pariette Draw, Gilsonite Draw, and Wells Draw along the lower portions of the larger ephemeral washes and in deeper bedrock formations beneath the MBPA. However, because of limited development and the great depth to the bedrock aquifers, only a few water wells are located within the MBPA.

Only existing permitted groundwater sources would need to be used for drilling, completion, or production activities related to this project. While some of this groundwater would be injected back into the groundwater, these activities would result in permanent withdrawals of groundwater (produced formation water). Under Alternative C, groundwater withdrawals would result in total aquifer drawdown of approximately 43,866 acre-feet over a 41- to 51-year LOP, or about 860 acre-feet per year (see **Table 4.6.1.1.1.5-1**). Assuming no recharge, this represents a 0.14 percent decrease in the estimated 31 million acre-feet of water stored in aquifers in the Uinta Basin (UDWaR 1999), which would have a negligible impact on the quantity of groundwater in the area (see **Table 4.6.1.1.1.5-1**). Locally, these withdrawals may lower the water table, which could reduce the water supply available for domestic users and reduce flow into streams and springs.

Groundwater Quality

Deep or Confined Aquifers

Under Alternative C, potential direct and indirect impacts to usable groundwater sources would be effectively eliminated, reduced, or mitigated through the application of required and standard stipulations and lease notices and through the guidance, regulations, BLM Onshore Oil and Gas Orders, and standard COAs discussed below; the same as for the Proposed Action. These stipulations would be the same as would be implemented for the Proposed Action.

Shallow or Alluvial Aquifers

Under Alternative C, potential direct and indirect impacts to shallow or alluvial groundwater sources would be effectively eliminated, reduced, or mitigated through the same measures as would be implemented for the Proposed Action.

Although Alternative C and the Proposed Action have the same number of wells, the potential for contaminating shallow or alluvial aquifers under Alternative C would be slightly greater than those for the Proposed Action, because more surface disturbance is anticipated under Alternative C.

Springs

Even though Alternative C and the Proposed Action have the same number of wells, the potential impacts and risk of contamination to springs would be slightly greater under Alternative C than what would be expected for the Proposed Action, because more surface disturbance is anticipated under Alternative C.

4.6.1.4 Alternative D – Agency Preferred Alternative

4.6.1.4.1 Water Requirements

Under Alternative D, no surface disturbance would occur within 100-year floodplains.

4.6.1.4.1.1 Well Drilling and Completion Phase

About 0.9 acre-feet of water would be required to drill and complete each Green River oil well, and about 6.2 acre-feet would be required to drill and complete each deep gas well. The total water use for drilling and completion of all Green River oil wells (3,250 wells) and deep gas wells (2,500 wells) would be about 18,425 acre-feet, or approximately 1,150 acre-feet of water per year over the 16-year drilling and completion activities period.

It is assumed that a total of 0.08 acre-feet would be needed for dust suppression at each well pad, access road, and pipeline/utility corridor during construction activities for the new well pads (potentially 2,783 well pads). It is further assumed that only 10 percent of total well pads would require dust suppression efforts (278). Newfield would need a total of about 22 acre-feet for dust suppression during well construction and completion, or about 1.4 acre-feet per year over the 16-year drilling and completion activities period.

During the well drilling and completion phase, the annual water demand would be 1,151 acre-feet for the 16-year drilling and completion activities period. It is assumed that necessary water would be acquired from permitted surface water sources before permitted groundwater sources. The available permitted surface water sources total about 382 acre-feet per year. Assuming the drilling and completion period is 16 years, the remainder (769 acre-feet/year) would be obtained from permitted groundwater sources.

4.6.1.4.1.2 Production Phase

It is assumed that about 0.13 acre-feet per well pad would be used annually for dust suppression at each well pad (potentially 2,783 well pads), access road, and pipeline/utility corridor during the operation of the wells, which would occur after well construction for 20 to 30 years. This water use applies to only 10 percent of the well pads annually (278). Based on these assumptions, Newfield would use approximately 36 acre-feet of water per year for dust suppression and 723 to 1,084 acre-feet for the 20- to 30- year period of operation.

Approximately 750 existing wells within the MBPA would be converted to water-flood injection wells. Assuming approximately 0.01 acre-feet of water would be used daily for each water-flood injection well, the annual water requirement for water-flooding operations would be about 2,738 acre-feet. It is expected that about 50 percent of the water needed for flooding operations would come from recycled produced water, and the other 50 percent would come from fresh water sources.

The annual water requirement would be the sum of the dust suppression and water-flooding water demands or 2,774 acre-feet. It is assumed that recycled produced water would constitute 50 percent of water needed for production. If each of the 5,750 wells produces (assuming 0.24 acre-feet of water that can be recycled), then there would be 1,380 acre-feet of recycled water available to be used each year. Additionally, Alternative D would use all of the available annual surface water allotments (382 acre-feet per year). The remainder of the water demand (1,012 acre-feet/year) would be met by permitted groundwater sources.

4.6.1.4.1.3 Abandonment and Reclamation Phase

During the abandonment and reclamation phase, the well pads and appurtenant facilities would still need dust suppression, so the annual water demand would be 36 acre-feet. Because the wells are no longer producing, this entire demand would be met from permitted surface water sources. **Table 4.6.1.4.1.3-1** shows the water requirements and source of water for Alternative D.

TABLE 4.6.1.4.1.3-1
WATER REQUIREMENTS AND WATER AVAILABILITY
FOR ALTERNATIVE D – AGENCY PREFERRED ALTERNATIVE

Project Phase	Total Water Requirement (acre-feet/year)	Available Permitted Surface Water (acre-feet/year)	Available Permitted Groundwater (acre-feet/year)	Available Recycled Produced Water (acre-feet/year)	Recycled Produced Water Use (acre-feet/year)	Permitted Surface Water Use (acre-feet/year)	Permitted Groundwater Use (acre-feet/year)
Well Drilling and Completion (16 years)	1,151	382	12,236	0	0	382	769
Production (20-30 years)	2,774	382	12,236	1,380	1,380	382	1,012
Abandonment and Reclamation (5 years)	36	382	12,236	0	0	36	0

4.6.1.4.1.4 Surface Water Resources

<u>Surface Water Use</u>

During the well drilling and completion phase, surface water needs of 382 acre-feet per year for Alternative D would potentially deplete the flow in the Green River (3,933,750 acre-feet per year) by less than 0.01 percent. During the production phase, surface water needs would be identical to those during the well drilling and completion phase, as both require the maximum permitted amount. During the abandonment and reclamation phase, Alternative D would require only 36 acre-feet per year and would have a negligible effect on the Green River flow. Assuming a constant water demand throughout the year, the monthly water demand (32 acre-feet) would be about 0.03 percent of the flow in the Green River in January (118,000 acre-feet). Thus, the project-related flow depletion would be negligible from a hydrologic standpoint.

On an annual basis, Alternative D would use a maximum of 382 acre-feet per year and would potentially deplete the flow in Pariette Draw (16,500 acre-feet per year) by about 2.3 percent. Assuming a constant water demand, the monthly water demand would be about 32 acre-feet of water, which would be about 6.8 percent of the January flow in Pariette Draw (470 acre-feet). In October, the water demand would be about 1.6 percent of the Pariette Draw flow (2,900 acre-feet). This is a minor percent of the total flow, but it may need to be mitigated by using groundwater to meet project demands.

Floodplains

Under Alternative D, pipelines would cross ephemeral streams at approximately 1,046 locations within the MBPA. Because the pipelines would be buried in the floodplains, the Project would have no impact on the width of the floodplain or the water surface elevation for a given flood event. The water source well would have minimal impacts on the floodplain, even in the event of a 100-year flood, given that the well would be flush with the ground surface after construction, the drilling pad would be reclaimed, and there would be no storage of hydrocarbons in the floodplain.

Surface Water Quality

Accidental spillage of potentially toxic substances could potentially occur under Alternative D, due to pipeline, wellhead, and storage tank leaks and tanker truck spills at stream crossings. The magnitude of these impacts would be largely dependent on the proximity of the spill to surface water features, the volume of material spilled, the permeability of the soils in the area, the ground slope between the spill site and the surface water feature, and the timing and intensity of rainfall or snowmelt.

If the number and quantity of spills is proportional to the number of wells drilled and operated, then Alternative D would potentially have the same risk of spillage as could occur under the Proposed Action or Alternative.

Section 2.6.1 includes several salient design features that would substantially reduce potential impacts to surface water under Alternative D. Specifically, under Alternative D:

- No surface disturbance would occur within 500 feet of Pariette Creek or Pariette ponds.
- No new well pad-related surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas.
- No new pipeline- or road-related surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas unless there are no practical alternatives or the action is designed to enhance the riparian resources. Unavoidable impacts would be fully mitigated.
- For all tributaries that drain directly to Pariette Draw or directly to the Green River, roads and well pads would be set back a minimum of 200 feet from the active stream channel (average 3-feet wide or greater without an associated riparian zone) unless site-specific analysis demonstrates that:
    - 1) the proposed well or road could be placed on higher terrain above the 100-year floodplain,
    - 2) the 100-year floodplain can be demonstrated to be narrower than 200 feet in the area proposed for well location; or
    - 3) the well pad or road can be increased in height to avoid a predicted over-topping 50-year flood.
        - In these situations, the well pad or road would not be placed closer than 100 feet from the stream channel.
- Pipelines that cross or are within 100-year floodplains will either be elevated above the predicted 100-year flood event on a pipe bridge, or buried at least 5 feet below the channel bottom or below

the predicted scour depth for an equivalent flood event (whichever is deeper) and in conformance with hydrological design practices.

- Pipelines that cross stream channels will incorporate a sediment retention system along the construction corridor to minimize movement of sediment into the water courses. These could range from silt fencing and culverts to sediment retention basins, depending on the location.
- Newfield will utilize the applicable USFWS BMPs for work in Utah streams where pipelines or roads cross a stream.
- Road crossings of drainages will be built to accommodate the 100-year flood, typically using at-grade crossings rather than culverts. Crossings will be designed so they will not cause siltation or accumulation of debris, nor will the roadbed block the drainage. Any culverts used will be designed and constructed to allow passage of aquatic species.
- As determined necessary on a site-specific basis (based on proximity to a 100-year floodplain), wells with the potential to contaminate surface waters will have automatic shutoff valves.
- Any pipeline conveying produced water or other industrial liquid across the 100-year floodplains as conceptually depicted in FEIS Figure 3.6.3.2-1 would be provided with shut-off valves immediately outside the 100-year floodplain on both sides of the crossing.
- Storage and parking locations for hazardous materials, lubricants, fuel tanks or trucks, and refueling activities would be a minimum distance of 100 meters from wetlands, riparian areas, and channels with defined bed and banks. Such materials storage or refueling activities would be outside the 100-year floodplains as depicted in FEIS Figure 3.6.2.3-1.
- Flow monitors would be installed on produced water pipelines to detect possible leaks. If any of the following impacts are observed, the adaptive management mitigation identified in the Long Term Water Quality Monitoring plan (see Appendix H) will be implemented:
    - increased sedimentation;
    - increased concentrations of inorganic constituents, including metals;
    - increased concentrations of selenium, boron, or total dissolved solids;
    - contamination with petroleum and other organic constituents;
    - reduction of spring flows; and/or,
    - reduction of water levels in wells.

These measures would enable BLM to better protect surface water quality than under Alternatives A or C.

Hydrofracturing would occur at depths of at least 4,500 feet or more below the surface; therefore, the potential for impacts to surface water resources from proposed hydrofracturing is considered to be negligible.

Total Maximum Daily Load Constituents of Concern

Alternative D could have some effect on the TMDL constituents of concern (selenium, boron, and TDS). These constituents are found in the soil and attach themselves to soil particles, additional eroded material resulting from the proposed project that is conveyed to Pariette Draw would contain these constituents of concern and would increase their concentration slightly in Pariette Draw. However, based on increased use existing and multi-well pads and the associated reduction in surface disturbance, TMDL increases would be less under Alternative D than under the Proposed Action or Alternative C.

Sediment, Turbidity, and Temperature

Increased erosion and subsequent increased sedimentation into perennial streams and ephemeral drainages within the MBPA is possible, especially during the construction of the project facilities. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. However, based on increased use existing and multi-well pads and the associated reduction in surface disturbance, erosion and sedimentation would be less under Alternative D than under the Proposed Action.

Tables 4.6.1.4.1.4-1 and 4.6.1.4.1.4-2 provide sediment yield estimates in the watersheds during the construction and development phase and the production phase under Alternative D, respectively. **Table 4.6.1.4.1.4-3** summarizes the sediment yield produced for existing conditions and during each project phase.

TABLE 4.6.1.4.1.4-1
SEDIMENT YIELD DURING WELL DRILLING AND COMPLETION PHASE
UNDER ALTERNATIVE D – AGENCY PREFERRED ALTERNATIVE

Sediment Source	Antelope Creek Watershed (tons/year)	Upper Pariette Draw Watershed (tons/year)	Sheep Wash - Green River Watershed (tons/year)	Lower Pariette Draw Watershed (tons/year)	Total Study Area (tons/year)
Stream Crossings	0	40.4	5.9	20.2	66.4
Well Pads and Facilities	0	0.008	0.002	0.003	0.013
General Erosion	189	59,479	22,827	122,237	204,732
Total	189	59,519	22,833	122,257	204,798

Source Note: Summations may not total precisely due to rounding.

TABLE 4.6.1.4.1.4-2
SEDIMENT YIELD DURING PRODUCTION PHASE
UNDER ALTERNATIVE D – AGENCY PREFERRED ALTERNATIVE

Sediment Source	Antelope Creek Watershed (tons/year)	Upper Pariette Draw Watershed (tons/year)	Sheep Wash - Green River Watershed (tons/year)	Lower Pariette Draw Watershed (tons/year)	Total Study Area (tons/year)
Stream Crossings	0	20.7	3.2	10.2	34.1
Well Pads and Facilities	0	0	0	0	0
General Erosion	189	59,479	22,827	122,237	204,732
Total	189	59,500	22,830	122,247	204,766

Source Note: Summations may not total precisely due to rounding.

TABLE 4.6.1.4.1.4-3
TOTAL SEDIMENT YIELD COMPARISON
UNDER ALTERNATIVE D – AGENCY PREFERRED ALTERNATIVE

Sediment Source	Existing Conditions (tons/year)	Well Drilling and Completion Phase (tons/year)	Production Phase (tons/year)
Stream Crossings	24.9	66.4	34.1
Well Pads and Facilities	0	0.013	0
General Erosion	204,732	204,732	204,732
Total	204,757	204,798	204,766
Increase Over Existing Conditions	-	41	9
Percent Increase Over Existing Conditions	-	<0.1%	<0.1%

Source Note: Summations may not total precisely due to rounding.

Based on data collected at the USGS gaging stations, annual sediment loading in the Green River at Ouray, Utah, is about 6,789,000 tons. The highest sediment loading occurs during the months of May and June from snowmelt runoff. If it is assumed that all sediment from the construction of the project facilities would eventually be transported to the Green River, the increased sediment loading to the Green River would be less than 0.1 percent during the well drilling and completion phase and the production phase. Because of the close relationship between salinity and sediment, it is anticipated that salinity levels in the Green River would increase by a similar percentage.

Water from Pariette Draw is also diverted into the Pariette Wetland ponds, so the Project would slightly increase the sediment load into the first pond. Because the flow velocity through the first pond is close to zero, suspended sediment would settle out in the first pond and would not be conveyed to subsequent ponds. The increased load to the first pond would have a negligible effect on the pond over the LOP.

The amount of potential turbidity increase through fugitive dust cannot be quantified, but it is expected to be small when compared to the amount of increased turbidity that would potentially result from the increased erosion of soils. New graveled roads and well pads could contribute greater runoff than undisturbed sites. If there was increased runoff, it would lead to slightly higher peak flows, potentially increasing erosion of roadside ditches and channel banks. The increased erosion could potentially raise turbidity and salinity in streams during storm events.

Because Alternative D has a negligible effect on flow in the Green River, the alternative would not affect erosion rates along the river banks or change the distribution of sediment within the river. If surface water is withdrawn from Pariette Draw and its tributaries, the effect would be minor and would actually reduce streambank erosion. Sediment deposition or erosion within the channels would depend on many factors, but it would be expected that if the sediment load is increased and flow is decreased, there would be some deposition in the channel bottoms.

Because of the small percentage of additional sediment under Alternative D, it would have a negligible effect on the temperature of the water in Pariette Draw or its tributaries or in the Green River.

The alternative would have negligible impacts to secondary beneficial uses such as boating, wading, or similar uses; cold water species of game fish and other cold water aquatic life; and agricultural uses including irrigation of crops and stock watering. It is not expected that the small increase in sediment load would significantly impact boating, wading, or other similar uses in Pariette Draw and the Green River. Similarly, it is not expected that the increase in sediment load would affect the temperature in Pariette Draw or the Green River so that it could affect cold water aquatic species, or that the increase in sediment load would negatively impact the water quality for agricultural uses.

4.6.1.4.1.5 Groundwater Resources

<u>Groundwater Depletion</u>

Only existing permitted groundwater sources would be used for drilling, completion, or production activities related to this project. While some of this groundwater would be re-injected, these activities would result in permanent withdrawals of groundwater (produced formation water). Under Alternative D, produced groundwater would result in total aquifer drawdown of approximately 42,664 acre-feet over a 41- to 51-year LOP, or about 837 acre-feet per year (see **Table 4.6.1.1.1.5-1**).

Assuming no recharge, this represents a 0.14 percent decrease in the estimated 31 million acre-feet of water stored in aquifers in the Uinta Basin (UDWaR 1999), which would have a negligible impact on the quantity of groundwater in the area (see **Table 4.6.1.1.1.4-1**). Locally, these withdrawals may lower the water table, which could reduce the water supply available for domestic users and reduce flow into streams and springs.

<u>Groundwater Quality</u>

Deep or Confined Aquifers

Under Alternative D, potential direct and indirect impacts to usable groundwater sources would be effectively eliminated, reduced, or mitigated through the application of required and standard stipulations and lease notices and through the guidance, regulations, BLM Onshore Oil and Gas Orders, and standard COAs discussed below; the same as for the Proposed Action. These stipulations would be the same as would be implemented for the Proposed Action.

Shallow or Alluvial Aquifers

The potential for contaminating shallow or alluvial aquifers under Alternative D is thought to be the same as Alternative A, as the well count and composition would be similar.

Springs

Under Alternative D, the potential impacts to springs are the same as what would be expected under the Proposed Action.

4.6.2 Mitigation

In addition to the ACEPMs detailed in **Sections 2.2.12.3** and **2.2.12.4** and the proposed mitigation measures described in **Section 4.5.2**, the following mitigation measures could be required by BLM:

- For all tributaries that drain directly to Pariette Draw or directly to the Green River, roads and well pads would be set back a minimum of 200 feet from the active stream channel (average 3-feet wide or greater without an associated riparian zone) unless site specific analysis demonstrates that: 1) the proposed well or road could be placed on higher terrain above the 100-year floodplain; 2) the 100-year floodplain can be demonstrated to be narrower than 200 feet in the area proposed for well location; or 3) the well pad or road can be increased in height to avoid a predicted over-topping 50-year flood. In these situations, the well pad or road would not be placed closer than 100 feet from the stream channel.

- All new stream crossings would be kept to a minimum. In the case of an unavoidable stream crossing, culverts would be designed and constructed to allow fish passage. All stream crossings would be designed and constructed to keep impacts to riparian and aquatic habitat to a minimum.
- Before development, springs would be delineated, identified on maps, and marked in the field in order to keep impacts to springs to a minimum.
- Appropriate BMPs needed to mitigate water impacts anticipated to occur from surface-disturbing activities would be identified during the onsite and may include, but not be limited to: proper culvert design, installation of energy dissipation devices, proper site selection (e.g., avoidance of steep slopes, riparian areas, wetlands, areas subject to severe soil movement, and areas of shallow groundwater and natural watercourses), and utilizing closed loop drilling.

4.6.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts from the each of the alternatives would include long-term reductions in available surface water and groundwater resources as a result of Project withdrawals. Increased salinity and selenium concentrations in surface waters would occur under each of the alternatives, due to ongoing project activities that result in erosion and sedimentation from initial or ongoing surface disturbances.

4.6.4 Irretrievable and Irreversible Commitments of Resources

There would be no irreversible impacts to water resources. The proposed project could result in an increased sediment load and turbidity in Pariette Draw within the MBPA, due to erosion of exposed earth and increased runoff from the well pads and appurtenant facilities during all phases of the Project. Because TDS) are in the soil and would move as the soil is eroded, the project activity could also result in an increase in these parameters. Other potential impacts would include the following:

- Accidental spillage of potentially toxic substances resulting from direct spills of materials into a creek, pond, or canal or indirect contamination of surface water due to migration of petroleum from areas of soil contamination adjacent to surface water bodies; and
- Contamination of the alluvial groundwater sources from spills or unsealed wells.

4.6.5 Relationship of Short-Term Uses to Long-Term Productivity

Construction of roads, pipelines, wells, and associated facilities would provide a short-term mineral use that would result in long-term impacts to surface water and groundwater quantities available in the area. Long-term impacts to surface water and groundwater quantities are due to the consumptive use of these resources for well drilling, completion, and production. Other impacts to water resources as a result of short-term mineral use would be limited to the LOP.

4.7 VEGETATION

4.7.1 Direct and Indirect Impacts

Table 4.7.1-1 summarizes the direct disturbances to vegetation communities by each alternative.

TABLE 4.7.1-1
DIRECT DISTURBANCES TO VEGETATION COMMUNITIES BY ALTERNATIVE

Alternative	Scrub/ Shrub Dist. (acres)	Grassland/ Herbaceous Dist. (acres)	Wetland Dist. (acres)	Barren Land Cover Dist. (acres)	Previously Altered/Dist. Lands Dist. (acres)	Total Suitable Wildlife Habitat Dist. (acres)	Dist. of Existing Dev. (acres)
Alternative A (Proposed Action)	7,857	1,090	677	702	679	10,995	4,892
Alternative B (No Action)	432	49	29	20	96	626	171
Alternative C (Field-wide Electrification)	10,305	1,407	857	861	912	14,342	4,952
Alternative D (Agency Preferred Alternative)	5,852	748	403	354	420	7,346	2,174

4.7.1.1 Alternative A – Proposed Action

Construction and operation of the proposed project under the Proposed Action would result in direct and indirect impacts to the vegetation communities in the MBPA. Direct effects to vegetation (i.e., modification of community structure, species composition, and extent of cover types) would occur from disturbance or removal of vegetation as a result of the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities. Indirect effects to vegetation may include short-term and long-term increased potential for noxious weed invasion, exposure of soils to elevated erosion, soil compaction, and shifts in overall species composition and/or changes in plant density.

Direct impacts to agricultural lands would include conversion of cultivated crop and/or pastureland to energy-related development. Depending on the placement of well pads, linear features (roads and utility corridors), and support infrastructure on agricultural lands, the proposed development could also directly affect the usability of adjacent land for agricultural purposes.

Under the Proposed Action, agricultural lands would not be returned to agricultural use until the end of the LOP. Based on the negotiated individual SUA, private landowners would be financially compensated for the conversion of their private surface lands, including agricultural lands, for energy development purposes.

Implementation of the Proposed Action would result in the direct disturbance of approximately 15,877 acres of vegetation (see **Table 4.7.1.1-1**). This includes approximately 7,857 acres of scrub/shrubland, 1,090 acres of grassland/herbaceous, 677 acres of wetlands, 702 acres of barren land, and 5,571 acres of already altered/disturbed or developed vegetation cover types. Following construction, approximately 8,372 acres of initial disturbance (53 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with the implementation of the Proposed Action to approximately 7,505 acres.

TABLE 4.7.1.1-1
VEGETATION COMMUNITIES AFFECTED BY ALTERNATIVE A - PROPOSED ACTION

Land Cover Type	Vegetation Community	Initial (Short-Term) Disturbance (Acres)	Residual (long-term) Surface Disturbance
Scrub/Shrub	Colorado Pinyon-Juniper Woodland and Shrubland	630	263
	Colorado Plateau Mixed Low Sagebrush Shrubland	2,318	1,024
	Intermountain Basins Big Sagebrush Shrubland	616	256
	Intermountain Basins Mat Saltbrush Shrubland	72	27
	Intermountain Basins Mixed Salt Desert Scrub	4,221	1,827
Total		**7,857**	**3,397**
Grassland/ Herbaceous	Intermountain Basins Semi-Desert Grassland	286	138
	Intermountain Basins Semi-Desert Shrub Steppe	804	311
Total		**1,090**	**449**
Wetlands	Intermountain Basins Greasewood Flat	641	240
	Rocky Mountain Lower Montane Riparian Woodland and Shrubland	20	5
	North American Arid West Emergent Marsh	--	--
	Open Water	6	1
Total		**667**	**246**
Barren Lands	Colorado Plateau Mixed Bedrock Canyon and Tableland	468	168
	Intermountain Basins Shale Badland	234	72
Total		**702**	**240**
Altered/Disturbed Lands	Invasive Annual Grassland	392	167
	Invasive Southwest Riparian Woodland/Shrubland	8	1
	Agricultural Lands	279	107
	Existing Development	4,892	2,898
Total		**5,571**	**3,173**
Grand Total		**15,887**	**7,505**

Interim reclamation for portions of the well pads and access roads not needed for production facilities/operations and facilitates would be completed within 6 months following completion of the last well planned for the pad. Pipeline ROWs would be reclaimed within 6 months of pipeline installation. Seeding of temporarily disturbed areas along roads and pipelines would be completed within 30 days following the completion of construction. Assuming these measures are effectively applied, significant impacts that relate to vegetation are not likely to occur. Based on previous experience, Newfield anticipates that they will be able to successfully reclaim disturbed areas through the use of self-enforced reclamation methods and monitoring, and strict adherence to the Green River District Reclamation Guidelines. Newfield uses numerous reclamation methods, including:

- Drill seeding
- Broadcast Seeding
- Blow/Chisel/Crimp Straw
- Soil Amendments
- Compost
- Woody Biomass
- Live Mulch
- Soil Blend
- Harrowing
- Imprinting
- Dimpling

The selected method(s) for a site-specific disturbance location is based on site-specific conditions, including the following:

- Timing
- Weed Control
- Soil Type and Temperature
- Intimate Seed Contact, Seeding Window[3]
- Seed Quality, Germination, and Dormancy
- Water
- Salt and Sodicity of Soils

The above analysis is predicated on the following assumptions: a) interim and final reclamation actions outlined in **Section 4.7.3** would be determined successful; b) ground cover would be present within 3 to 5 years on reseeded/reclaimed sites; and c) shrub species would be present in 10 to 15 years on reseeded/reclaimed sites. Of the estimated 15,877 acres of new surface disturbance associated with the Proposed Action, approximately 47 percent (7,505 acres) would remain in a disturbed condition for the estimated 41- to 51-year LOP, or longer. To date, quantifiable reclamation data in the MBPA is inconclusive as to whether current reclamation actions are proving consistently successful and whether the expectation of the time to achieve success is appropriate. Current reclamation methods and guidance have been developed and implemented in a learning environment. If continued short-term and long-term monitoring of reclamation actions is undertaken within the MBPA over the LOP, and reclamation objectives and specific reclamation actions are adjusted for changing environmental conditions and ongoing uses, impacts to vegetation resources would be substantially minimized.

[3] The term ‘‘intimate seed contact’’ means achieving proper seed planting depths, and ‘‘seeding window’’ means seeding during the best possible season/weather patterns.

Implementation of the Proposed Action also would increase the potential for the occurrence of indirect effects. Disturbances from construction could increase the potential for the limited invasion and establishment of noxious weed species. Noxious weeds tend to be aggressive colonists of disturbed areas where the native vegetation has been removed. Therefore, disturbances associated with construction of the proposed project could provide opportunities for noxious weeds to invade and become established. Disturbance leads to dispersal and encouragement of non-native seeds from roads and other areas by vehicles and other equipment. Invasion by non-native grasses is particularly problematic, because the grasses are capable of effectively competing with native species for space, water, light, nutrients, and subsequent survival. Over time, the successful establishment of non-native grasses can out-compete native vegetation and eventually dominate large areas. An increase in weedy annual grasses also increases the potential for fire by increasing the density and flammability of available fuels. Grasses are substantially more flammable and establish in denser populations than woody and non-woody native desert vegetation. An increase in wildfire further encourages establishment of grasses, because they are quicker and more capable of re-establishment after fire. If it becomes established in the MBPA, non-native grassland vegetation could potentially expand into, and ultimately displace, native desert shrub communities in adjacent areas (Brooks 1999). In addition, invasive weeds can adversely affect the visual character of an area.

In order to minimize the potential for adverse effects from invasive and noxious weed establishment, monitoring of invasive and noxious weeds could be necessary. If found, control and eradication measures would be implemented as outlined in the COAs for each APD associated with the Project. The implementation of these measures along with other recommended mitigation measures and ACEPMs detailed in **Section 2.2.12.5** would minimize the potential for adverse impacts to vegetation from noxious weeds.

Additional indirect impacts could include an increased potential for wind erosion of disturbed surfaces into adjacent areas. Airborne dust generated by vehicles could inhibit photosynthesis and transpiration in vegetation. Inhibited and reduced rates of photosynthesis could affect the rate of growth, the reproductive capacity of individual plants, and ultimately the ability of these individuals to persist in adjacent areas. Varying amounts of dust settling on vegetation can block stomata, increase leaf temperature, and reduce photosynthesis (Thompson et al. 1984, Farmer 1993). However, native desert vegetation naturally experiences chronic exposure to windblown dust and is not likely to be significantly affected, except in extreme cases along travel corridors where sand loosened by excessive vehicular activities could accumulate and partially bury individuals residing in adjacent habitat. Because intensive dust creation is only expected to occur during construction, dust pollution that results from construction activities is expected to have only short-term minimal impacts on vegetation.

4.7.1.1.1 Wetland Vegetation

The Proposed Action would result in the initial loss of approximately 661 acres of wetland vegetation types, including approximately 20 acres of Rocky Mountain Riparian Woodlands and Shrublands and approximately 641 acres of Intermountain Basins Greasewood Flat vegetation. Following interim reclamation, surface disturbance to wetland vegetation would be reduced to approximately 245 acres. Wetland areas not directly impacted by the Proposed Action may be exposed to indirect impacts as a result of construction and operation activities. Wetland habitats may be subject to increased levels of sedimentation and increased potential for pollution resulting from accidental spills of petroleum products, fuels, or other chemicals. Contamination and increased sediment loads could potentially harm a wetland’s ability to function properly and may result in the loss of wetland flora and fauna. Implementation of site-specific mitigation measures outlined during the APD process, as well as ACEPMs for soil resources

(**Section 2.2.12.3**) and health and safety/hazardous materials (**Section 2.2.12.10**), would reduce potential direct and indirect impacts to wetland habitats within the MBPA.

4.7.1.2 Alternative B – No Action Alternative

Under the No Action Alternative, direct and indirect impacts to vegetation resources, including agricultural lands, within the MBPA would be similar in nature and scope as those described under the Proposed Action. However, potential impacts under the No Action Alternative would be substantially lower, because only 788 new oil and gas wells would be developed within the MBPA. The overall disturbance to vegetation would be approximately 797 acres, which is 95 percent less than that of the Proposed Action. (See **Table 4.7.1.2-1.**)

Under the No Action Alternative, the rate at which agricultural land would not be returned to agricultural use at the end of the LOP would be substantially lower than what would be expected under the Proposed Action. Based on the negotiated individual SUA, private landowners would be financially compensated for the conversion of their private surface lands, including agricultural lands, for energy development purposes.

Implementation of the No Action Alternative would result in the direct disturbance of approximately 432 acres of scrub/shrubland, 49 acres of grassland/herbaceous, 29 acres of wetlands, 20 acres of barren land, and 267 acres of already altered/disturbed or developed vegetation cover types. Following construction, approximately 185 acres of initial disturbance (23 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with the implementation of the No Action Alternative to approximately 612 acres.

Indirect impacts, including the potential for the invasion and establishment of noxious weed species, increased potential for fire, and inhibited and reduced rates of photosynthesis from increased airborne dust, would be proportionally lower. For the same reasons described under the Proposed Action, indirect impacts from implementation of the No Action Alternative are expected to have only short-term, minimal impacts on vegetation.

TABLE 4.7.1.2-1
VEGETATION COMMUNITIES AFFECTED
BY ALTERNATIVE B - NO ACTION ALTERNATIVE

Land Cover Type	Vegetation Community	Initial (Short-Term) Disturbance (Acres)	Residual (long-term) Surface Disturbance (acres)
Scrub/Shrub	Colorado Pinyon-Juniper Shrubland and Woodland	51	34
	Colorado Plateau Mixed Low Sagebrush Shrubland	140	99
	Inter-Mountain Basins Big Sagebrush Shrubland	50	36
	Inter-Mountain Basins Mat Saltbrush Shrubland	2	1
	Inter-Mountain Basins Mixed Salt Desert Scrub	189	143
Total		**432**	**313**

Land Cover Type	Vegetation Community	Initial (Short-Term) Disturbance (Acres)	Residual (long-term) Surface Disturbance (acres)
Grassland/ Herbaceous	Inter-Mountain Basins Semi-Desert Grassland	16	15
	Inter-Mountain Basins Semi-Desert Shrub Steppe	33	26
Total		**49**	**41**
Wetlands	Intermountain Basins Greasewood Flat	28	21
	Rocky Mountain Lower Montane Riparian Woodland & Shrubland	1	1
	North American Arid West Emergent Marsh	--	--
	Open Water	--	--
Total		**29**	**22**
Barren Lands	Colorado Plateau Mixed Bedrock Canyon & Tableland	18	12
	Inter-Mountain Basins Shale Badland	2	2
Total		**20**	**14**
Altered/Disturbed	Agricultural Lands	79	57
	Existing Development	171	152
	Invasive Annual Grassland	17	13
	Invasive Southwest Riparian Woodland/Shrubland	--	--
Total		**267**	**222**
Grand Total		**797**	**612**

*Total acreage estimates are based on GIS-software calculations and may not equal the total acreage calculated in Chapter 2 due to rounding, removal of overlapping development, and minute boundary discrepancies
Source Note: Summations may not total precisely due to rounding

4.7.1.2.1 Wetland Vegetation

Impacts to wetland vegetation would be similar in nature and scope to those described under the Proposed Action. However, they would be substantially less as only 29 acres of surface disturbance would occur in areas with mapped wetland vegetation. Under the No Action Alternative, there would be a lower increase in erosion and subsequent sedimentation as a result of project activity. Additionally, the No Action Alternative has a lower potential for indirect impacts from accidental spills of hazardous materials than the other alternatives proposed, as fewer wells would be drilled. Implementation of site-specific mitigation measures outlined during the APD process as well as ACEPMs for soil resources (**Section 2.2.12.3**) and health and safety/hazardous materials (**Section 2.2.12.10**) would reduce potential direct and indirect impacts to wetland habitats within the MBPA.

4.7.1.3 Alternative C – Field-Wide Electrification

The types of direct and indirect impacts to vegetation resources, including agricultural lands, under Alternative C would be similar to those as the Proposed Action, except that Alternative C would have an additional 3,407 acres of surface disturbance due to the installation of transmission lines and substations.

Under Alternative C, the rate at which agricultural land would not be returned to agricultural use at the end of the LOP would be slightly higher than what would be expected under the Proposed Action. Based on the negotiated individual SUA, private landowners would be financially compensated for the conversion of their private surface lands, including agricultural lands, for energy development purposes.

Implementation of Alternative C would result in the direct disturbance of 16,308 acres of vegetation (see **Table 4.7.1.3-1**). This includes approximately 10,305 acres of scrub/shrubland, 1,407 acres of grassland/herbaceous, 857 acres of wetland, 861 acres of barren land, and 5,864 acres of already altered/disturbed or developed vegetation cover types. Following construction, approximately 9,567 acres of initial disturbance (50 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with the implementation of Alternative C to approximately 9,727 acres.

Alternative C would have the greatest potential for direct impacts to vegetation communities among the alternatives considered, because implementation of Alternative C would result in the greatest amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities. Therefore, indirect impacts, including the potential for the invasion and establishment of noxious weed species, increased potential for fire, and inhibited and reduced rates of photosynthesis from increased airborne dust, would be proportionally higher. For the same reasons described under the Proposed Action, indirect impacts from implementation of Alternative C are expected to have only short-term, minimal impacts on vegetation.

TABLE 4.7.1.3-1
VEGETATION COMMUNITIES AFFECTED
BY ALTERNATIVE C – FIELD-WIDE ELECTRIFICATION

Land Cover Type	Vegetation Community	Initial (Short-Term) Disturbance (Acres)	Residual (long-term) Surface Disturbance (acres)
Scrub/Shrub	Colorado Pinyon-Juniper Shrubland and Woodland	811	349
	Colorado Plateau Mixed Low Sagebrush Shrubland	3,083	1,374
	Inter-Mountain Basins Big Sagebrush Shrubland	806	351
	Inter-Mountain Basins Mat Saltbrush Shrubland	91	39
	Inter-Mountain Basins Mixed Salt Desert Scrub	5,514	2,514
Total		**10,305**	**4,627**

Land Cover Type	Vegetation Community	Initial (Short-Term) Disturbance (Acres)	Residual (long-term) Surface Disturbance (acres)
Grassland/ Herbaceous	Inter-Mountain Basins Semi-Desert Grassland	376	191
	Inter-Mountain Basins Semi-Desert Shrub Steppe	1,031	466
Total		**1,407**	**657**
Wetlands	Intermountain Basins Greasewood Flat	821	363
	Rocky Mountain Lower Montane Riparian Woodland & Shrubland	27	13
	North American Arid West Emergent Marsh	--	--
	Open Water	9	5
Total		**857**	**381**
Barren Lands	Colorado Plateau Mixed Bedrock Canyon & Tableland	602	260
	Inter-Mountain Basins Shale Badland	259	101
Total		**861**	**361**
Altered/Disturbed	Agricultural Lands	357	175
	Existing Development	4,952	3,268
	Invasive Annual Grassland	545	254
	Invasive Southwest Riparian Woodland/Shrubland	10	4
Total		**5,864**	**3,701**
Grand Total		**19,294**	**9,727**

*Total acreage estimates are based on GIS-software calculations and may not equal the total acreage calculated in Chapter 2 due to rounding, removal of overlapping development, and minute boundary discrepancies
Source Note: Summations may not total precisely due to rounding

4.7.1.3.1 Wetland Vegetation

Impacts to wetland vegetation under Alternative C would be similar in nature and scope to those described under the Proposed Action, but they would be slightly larger in magnitude as Alternative C proposes 3,407 more acres of surface disturbance in wetland areas. Indirect impacts to wetland vegetation, such as increased sedimentation and potential for accidental spills of hazardous materials, would be similar to those described under the Proposed Action, as both alternatives propose a similar level of disturbance. Implementation of site-specific mitigation measures outlined during the APD process, as well as ACEPMs for soil resources (**Section 2.2.12.3**) and health and safety/hazardous materials (**Section 2.2.12.10**), would reduce potential direct and indirect impacts to wetland habitats within the MBPA.

4.7.1.4 Alternative D – Agency Preferred Alternative

The type of direct and indirect impacts to vegetation resources, including agriculture lands, under Alternative D would be similar in nature and scope to those described for the Proposed Action. However, the magnitude of potential impacts would be substantially less under Alternative D, as fewer new well pads would be constructed and the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology.

Under Alternative D, the rate at which agricultural land would be returned to agricultural use at the end of the LOP would be higher than what would be expected under the Proposed Action. Based on the negotiated individual SUA, private landowners would be financially compensated for the conversion of their private surface lands, including agricultural lands, for energy development purposes.

The overall disturbance to vegetation under Alternative D would be 9,940 acres (see **Table 4.7.1.4-1**), which is approximately 37 percent less than that of the Proposed Action. This includes approximately 5,882 acres of scrub/shrubland, 403 acres of grassland/herbaceous, 217 acres of wetlands, 171 acres of barren land, and 2,594 acres of already altered/disturbed or developed vegetation cover types. Following construction, approximately 5,146 acres of initial disturbance (52 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with the implementation of Alternative D to approximately 4,794 acres.

This alternative would have the lowest potential for direct impacts to vegetation communities among the action alternatives considered, because it would have the least amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities. Therefore, indirect impacts, including the potential for the invasion and establishment of noxious weed species, increased potential for fire, and inhibited and reduced rates of photosynthesis from increased airborne dust, would be proportionally lower. For the same reasons described under the Proposed Action, indirect impacts from the implementation of Alternative D are expected to have short-term, minimal impacts on vegetation.

TABLE 4.7.1.4-1
VEGETATION COMMUNITIES AFFECTED
BY ALTERNATIVE D – AGENCY PREFERRED ALTERNATIVE

Land Cover Type	Vegetation Community	Initial (Short-Term) Disturbance (Acres)	Residual (long-term) Surface Disturbance (acres)
Scrub/Shrub	Colorado Pinyon-Juniper Shrubland and Woodland	492	247
	Colorado Plateau Mixed Low Sagebrush Shrubland	1,784	910
	Inter-Mountain Basins Big Sagebrush Shrubland	401	205
	Inter-Mountain Basins Mat Saltbrush Shrubland	46	23
	Inter-Mountain Basins Mixed Salt Desert Scrub	3,129	1,603
Total		**5,852**	**2,988**
Grassland/	Inter-Mountain Basins Semi-Desert Grassland	201	116
Herbaceous	Inter-Mountain Basins Semi-Desert Shrub Steppe	537	287
Total		**738**	**403**

Land Cover Type	Vegetation Community	Initial (Short-Term) Disturbance (Acres)	Residual (long-term) Surface Disturbance (acres)
Wetlands[1]	Intermountain Basins Greasewood Flat	402	216
	Rocky Mountain Lower Montane Riparian Woodland & Shrubland	1	0.4
	North American Arid West Emergent Marsh	--	--
	Open Water	--	--
Total		**403**	**217**
Barren Lands	Colorado Plateau Mixed Bedrock Canyon & Tableland	254	120
	Inter-Mountain Basins Shale Badland	100	51
Total		**354**	**171**
Altered/Disturbed	Agricultural Lands	120	55
	Existing Development	2,174	806
	Invasive Annual Grassland	297	154
	Invasive Southwest Riparian Woodland/Shrubland	3	1
Total		**2,594**	**1,016**
Grand Total		**9,940**	**4,794**

[1] Table 4.7.1.4-1 discloses potential impacts to vegetation types based on GIS mapping of conceptual locations for surface facilities overlain with vegetation layers. As a result, the table shows potential impacts to wetlands. However, under Alternative D, with the exception of the water collector well, no surface disturbance would occur within riparian habitats or 100-year floodplains. In addition, no wetlands would be impacted by the water collector well under Alternative D. Thus, in actuality there would be zero acres of disturbance to wetland habitats under Alternative D.
*Total acreage estimates are based on GIS-software calculations and may not equal the total acreage calculated in Chapter 2 due to rounding, removal of overlapping development, and minute boundary discrepancies
Source Note: Summations may not total precisely due to rounding

4.7.1.4.1 Wetland Vegetation

The nature of the conceptual mapping of a proposed project features resulted in GIS calculations of disturbance to wetland habitats from conceptually located pads and ROWs. However, it is important to note that during the site-specific APD process under Alternative D, impacts to wetland habitats would be avoided in accordance with the protective design features defined in Sections 2.6. – 2.6.3. Based on the conceptual mapping of proposed project features, GIS calculations for Alternative D show initial disturbance of approximately 404 acres of wetlands, of which 217 acres would remain disturbed after reclamation. Of the 404 acres of conceptual impacts to wetlands, approximately 45 acres of initial disturbance are mapped within the Pariette Wetlands ACEC.

4.7.2 Mitigation

In addition to the ACEPMs detailed in **Section 2.2.12.5**, the following recommended mitigation measures could be applied to reduce direct and indirect impacts to vegetation resources, many of which are included as design features under Alternative D:

- Mulching, soil amendments, and other state-of-the-art techniques would be used on a site-specific basis as determined necessary to assure the highest possible revegetation success.
- In areas that contain environmentally sensitive fragile soils and vegetation, the operator may be required to perform special measures such as mulching, installing erosion fencing, use of erosion fabric, etc. (per the direction of the AO) to stabilize any disturbed areas and ensure the re-establishment of long-term perennial vegetation.
- Inter-seeding (i.e., seeding into existing vegetation), secondary seeding, or staggered seeding may be used as determined necessary on a site-specific basis to accomplish specific revegetation objectives.
- Vegetation removed from short-term surface-disturbance areas would be spread over the disturbed site to capture native seed and facilitate revegetation.
- In accordance with the appropriate AO's guidance and direction, regular, qualitative and quantitative field monitoring of reclaimed areas would be conducted over the LOP to determine the effectiveness of the applied reclamation actions. Should the prescribed reclamation actions not have the desired or anticipated results, or are not moving in a direction to achieve the desired/anticipated results, revised reclamation objectives may be appropriate and additional or new reclamation methods would be implemented. Such an adaptive management approach to reclamation would ensure reclaimed areas are restored to successful pre-disturbance production levels.
- All products (such as mulches, straw bales, etc.) used for erosion control would be certified weed-free.
- Construction equipment and vehicles coming from outside of the Uinta Basin would be power-washed prior to entering the MBPA. Any construction or operational vehicles traveling between the MBPA and areas outside of the Uinta Basin would be power-washed prior to re-entrance.
- Areas disturbed by project-related activities, including roads, well pads, etc., with soils that are susceptible to wind erosion would be surfaced (covering of piles where appropriate, graveling or surfactants applied to roads, etc.) on a site-specific basis, as directed by the AO, to reduce fugitive dust generated by traffic and related activities. Such treatments would also be applied as directed by the AO on local and resource roads that represent a dust problem.
- All applicable surface stipulations from Appendix K and Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.
- To ensure their protection under Section 404 of the Clean Water Act and EO 11990 – Protection of Wetlands, wetland evaluations and delineations would be completed for any surface disturbance locations occurring in potential wetland habitat.
- Under Alternative D, the water collector well would be sited to avoid jurisdictional wetlands.
- No new surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas, unless there are no practical alternatives, impacts would be fully mitigated, or the action is designed to enhance the riparian resources.
- For all tributaries that drain directly to Pariette Draw or directly to the Green River, roads and well pads would be set back a minimum of 200 feet from the active stream channel (average 3 feet wide or greater without an associated riparian zone) unless site specific analysis demonstrates that: 1) the proposed well or road could be placed on higher terrain above the 100-year floodplain; 2) the 100-year floodplain can be demonstrated to be narrower than 200 feet in the area proposed for well location; or 3) the well pad or road can be increased in height to avoid a predicted over-topping 50-

year flood. In these situations, the well pad or road would not be placed closer than 100 feet from the stream channel.

- All new stream crossings would be kept to a minimum. In the case of an unavoidable stream crossing, culverts would be designed and constructed to allow fish passage. All stream crossings would be designed and constructed to minimize impacts to riparian and aquatic habitat.
- Appropriate BMPs needed to mitigate water impacts anticipated to occur from surface-disturbing activities would be identified during the onsite and may include, but would not be limited to: proper culvert design, installation of energy dissipation devices, proper site selection (avoidance of steep slopes, riparian areas, wetlands, areas subject to severe soil movement, and areas of shallow groundwater and natural watercourses), and using closed-loop drilling.

4.7.3 Unavoidable Adverse Impacts

Removal of vegetation associated with construction and expansion of well pad sites, access roads, pipeline corridors, and other ancillary facilities is unavoidable under all alternatives. Additional unavoidable adverse impacts to vegetation under all alternatives include the increased potential for noxious weed invasion and resultant wildfire, potential loss of prime farmlands, and shifts in overall species composition and/or changes in plant density within the MBPA. The action alternatives pose an increased risk of accidental spills along roads and pipelines.

4.7.4 Irretrievable and Irreversible Commitments of Resources

Long-term disruption of agricultural activities within the MBPA could result in irretrievable impacts if the next generation is unwilling to carry on with ongoing agricultural uses at the end of the LOP. However, based on the SUAs and commitment to successfully reclaim disturbed lands within the MBPA, private landowners would be satisfactorily compensated for the long-term conversion of agricultural lands to another use; thus, no irretrievable impacts to agricultural use would occur. Depending on the length of time needed to successfully reclaim the surface-disturbed lands in the MBPA, the cumulative impacts from the alternatives could result in irreversible impacts to agricultural use of lands within the MBPA. Opportunities to continue to use lands proposed for surface disturbance for agricultural use may be lost until the end of the LOP.

Because of their limited productivity and relatively high potential for invasion of invasive and noxious species, it is assumed that disturbed desert vegetation communities would lose at least some degree of functional value during the LOP. These communities would only become functionally active again following successful interim and final reclamation, and until such time, would be deemed irretrievable.

Due to the difficulty with removing noxious and invasive species from their introduced habitats, the invasion of these species into areas disturbed by project activities would be considered an irretrievable impact until restoration measures are completed and considered successful.

4.7.5 Relationship of Short-Term Uses to Long-Term Productivity

Due to slow revegetation rates and relatively low revegetation success, the proposed project would result in impacts to vegetation communities that would extend beyond construction, operation, and maintenance activities, affecting long-term ecological and anthropogenic uses of vegetation areas. For all alternatives, long-term impacts that may affect long-term productivity include the disturbance of herbaceous and shrub-dominated vegetation cover types that would require 10 to 15 years or more to recover, and the potential that populations of weedy annual species (e.g., halogeton, cheatgrass) may become established in localized areas for extended periods of time. The decrease in vegetation cover types either through direct impacts (i.e., removal of vegetation) or indirect impacts (i.e., the spread of noxious and invasive species) could impact ecological functions.

4.8 RANGE RESOURCES

Impacts to range resources are anticipated under each of the alternatives as a result of construction and operational activities. Direct and indirect effects on grazing livestock would include (1) the direct removal of forage and subsequent reduction in livestock AUMs; (2) increased potential for disrupting livestock operations; (3) increased oil and gas development-related traffic in allotments and potential impacts to range improvements; and (4) decreased quality and quantity of forage due to potential noxious weed infestations. The nature of potential impacts on range resources would be the same under all alternatives. However, the extent of impacts would vary by alternative, based on the amount of surface disturbance that would occur.

Based on existing grazing regulations, the BLM would continue to conduct regular monitoring of the vegetative condition on the grazing allotments and would determine the proper livestock stocking rate. Should BLM determine that a grazing allotment cannot support the livestock active AUMs stated for an allotment, BLM may choose to adjust the authorized AUMs. Such an action would be outside the scope of this document, and the BLM would consider such a site-specific analysis prior to adjusting any AUMs.

4.8.1 Direct and Indirect Effects

4.8.1.1 Alternative A - Proposed Action

The primary direct impact to livestock use in the MBPA is the amount of available forage lost as a result of proposed ground-disturbing actions (refer to **Section 4.7** for further discussion and analysis). Under the Proposed Action, approximately 16,129 acres[4] of vegetation would be removed within the MBPA as a result of new surface disturbance-related activities, of which 15,137 acres would occur within portions of the six grazing allotments contained wholly or partially within the MBPA. This would result in a total loss of approximately 1,682 AUMs (see **Table 4.8.1.1-1**).

TABLE 4.8.1.1-1
AMOUNT OF FORAGE LOST (AUMS) BY GRAZING ALLOTMENT IN THE MBPA UNDER ALTERNATIVE A - PROPOSED ACTION

Grazing Allotment	Total Livestock AUMs[1]	Calculated AUMs[1]		Alternative A – Proposed Action		
		In MBPA	Carrying Capacity (AUM/Ac)	Estimated Surface Disturbance	Estimated Forage Lost (AUMs)[2]	Percent of Total AUMs[3]
Antelope Powers	4,463	3,905	9	5,893	654.8	14.7
Castle Peak	4,760	2,498	9	3,235	359.5	7.6
Eightmile Flat	4,266	4,262	9	3,886	431.8	10.1

[4] This surface disturbance calculation is based on vegetation layers in GIS shapefiles and is very likely an overestimate given the amount of acreage within the MBPA that has previously been disturbed.

Grazing Allotment	Total Livestock AUMs[1]	Calculated AUMs[1]		Alternative A – Proposed Action		
		In MBPA	Carrying Capacity (AUM/Ac)	Estimated Surface Disturbance	Estimated Forage Lost (AUMs)[2]	Percent of Total AUMs[3]
Little Desert	3,804	166	9	191	21.2	0.6
Wells Draw	1,220	295	9	304	33.8	2.8
Wetlands	1,666	1,388	9	1,628	180.9	10.9
Total	**20,179**	**12,514**	**--**	**15,137**	**1,682**	**$\bar{x}$=7.8**

Note: Existing BLM data indicates that the average carrying capacity for the MBPA is about 9 AUMs/Acre. This carrying capacity may be too optimistic in light of the current development and prolonged dry periods affecting the MBPA given the ecological site description (ESD) for the area. For the purpose of analysis, 9 AUMs/Ac will be used as the basis for consistency between the alternatives presented in the EIS and BLM's 2012 FEIS for Gasco Energy, which analyzed a similar ecological site as the MBPA.

[1] Refer to **Table 3.8.2-1**

[2] Forage Lost = Estimated Surface Disturbance / Calculated Carrying Capacity (e.g., Antelope Powers = 5,893 acres/9 AUMs/ac = 654.8 AUMs, etc.)

[3] Percent of Total AUMs = Estimated Forage lost (AUMs) / Total Livestock AUMs

Direct impacts from construction and production activities to grazing allotments could also include impacts to lambing areas, potential disruption of lambing periods, and increased mortality and injuries to livestock resulting from increased vehicle traffic. In addition, livestock could be displaced from preferred grazing areas, range improvements (including water sources), and range study plots by construction and production activities.

Active lambing areas could be reduced or lost due to construction and production activities that take place in or near them. In addition, noise and human presence from construction and production activities near lambing areas could result in the disturbance of lamb and ewe pairs. Ewes disturbed by construction and production activities could abandon their lambs, resulting in increased lamb mortality.

The Proposed Action could also directly affect range improvements, stock watering, and facilities related to the control of livestock movement. With the addition of project-related facilities and access roads, there would be an increase in the number of gates to control livestock. In tandem with increased traffic levels, this would increase the potential for gates to be left open and for livestock to escape from the allotment. Fowler and Witte (1985) found that ranches had increased labor requirements from activities, such as gathering cattle, fixing fences, closing gates, removing litter, and repairing vandalism damages, that occurred during oil and gas development.

Additionally, the increase in the number of roads constructed to access wells within allotments, and the associated use of these roads, would increase the level of vehicular traffic within allotments. Although these roads would be constructed for use by Newfield's employees and contractors, they would also be used by the general public for recreation and other purposes. The additional traffic would increase the potential for harassment of, and collisions with, livestock. The increased traffic and expanded road network could also cause disruptions to livestock management, increasing the time and cost of these activities. The control and management of livestock could be affected, as more natural barriers to livestock movement are removed and as more livestock use roads as travel routes. Benefits from additional roads would include better access to grazing allotments, water resources, grazing facilities, and livestock.

Implementation of the Proposed Action could also increase the potential for the introduction and/or spread of noxious weeds, which could impact grazing resources within the MBPA. Noxious weeds are generally unpalatable to livestock, and their establishment would result in the reduction of available forage. Following surface disturbance activities, noxious weeds and invasive plant species may spread and colonize areas that typically lack or have minimal vegetation cover or areas that have been recently disturbed. Of specific concern is the species halogeton (*Halogeton glomeratus*), which is common in the area on disturbed sites. The consumption of halogeton can lead to intoxication and death in sheep and cattle (Torrell et al. 2000). The spread of halogeton in disturbed areas could lead to the loss of available native forage and increased livestock mortality.

The direct surface impacts and indirect impacts described above also have the potential to increase grazing pressure on undisturbed sections of grazing allotments. As disturbed portions of the grazing allotment become unavailable for grazing, the grazing pressure on the rest of the undisturbed portions of the allotment could increase. Depending on the seasonal timing of the disturbances, the length of time disturbed areas are unavailable, and the current grazing management, the undisturbed portions of the individual allotments potentially could be over-utilized, leading to further decreases in forage and potential reductions in stocking rates.

Impacts to rangelands under the Proposed Action would be minimized as follows:

- Adherence to the Utah BLM Rangeland Health Standards, as required by the Vernal RMP (BLM 2008b);
- Reclamation of surface disturbance associated with the proposed project;
- Implementation of alternatives in accordance with the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a) and;
- Implementation of Newfield’s Weed Control Plan (see **Section 2.2.12.5**).

In addition, ACEPMs detailed in **Sections 2.2.12.1.1 and 2.2.12.6**, which include the adherence to posted speed limits, maintenance of the integrity of existing fences, and proper installation and regular maintenance of cattle guards, would ensure management of livestock while on their allotments.

4.8.1.2 Alternative B – No Action Alternative

The nature and scope of direct and indirect impacts to range resources under the No Action Alternative would be similar to those for the Proposed Action, but of less magnitude. Under the No Action Alternative, Newfield would continue to construct roads, well pads, and ancillary facilities to complete up to 788 wells, including those proposed on State and private lands or minerals and those previously approved under the August 2005 ROD for the Castle Peak and Eightmile Flat Oil and Gas Expansion EIS.

Under the No Action Alternative, approximately 870 acres[5] of vegetation would be removed within the MBPA as a result of new surface disturbance-related activities, of which 792 acres would occur within portions of the six grazing allotments contained wholly or partially within the MBPA. This would result in a total loss of approximately 88 AUMs (see **Table 4.8.1.2-1**), which is approximately 95 percent less than what would be lost under the Proposed Action.

[5] This surface disturbance calculation is based on vegetation layers in GIS shapefiles and is very likely an overestimate given the amount of acreage within the MBPA that has previously been disturbed.

TABLE 4.8.1.2-1
AMOUNT OF FORAGE LOST (AUMS) BY GRAZING ALLOTMENT IN THE MBPA UNDER ALTERNATIVE B – NO ACTION ALTERNATIVE

Grazing Allotment	Total Livestock AUMs[1]	Calculated AUMs[1]		Alternative B – No Action		
		In MBPA	Carrying Capacity (AUM/Ac)	Estimated Surface Disturbance	Forage Lost (AUMs)[2]	Percent of Total AUMs[3]
Antelope Powers	4,463	3,905	9	166	18.4	0.5
Castle Peak	4,760	2,498	9	323	29.4	1.4
Eightmile Flat	4,266	4,262	9	202	28.9	0.5
Little Desert	3,804	166	9	-	-	-
Wells Draw	1,220	295	9	41	4.6	1.5
Wetlands	1,666	1,388	9	61	5.5	0.5
Total	**20,179**	**12,514**	**--**	**792**	**88**	**$\bar{x}$=4.4**

Note: Existing BLM data indicates that the average carrying capacity for the MBPA is about 9 AUMs/Acre. This carrying capacity may be too optimistic in light of the current development and prolonged dry periods affecting the MBPA given the ESD for the area. For the purpose of analysis, 9 AUMs/Ac will be used as the basis for consistency between the alternatives presented in the EIS and BLM's 2012 FEIS for Gasco Energy, which analyzed a similar ecological site as the MBPA.

[1] Refer to **Table 3.8.2-1**

[2] Forage Lost = Estimated Surface Disturbance / Calculated Carrying Capacity (e.g., Antelope Powers = 166 acres/9 AUMs/ac = 18.5 AUMs, etc.)

[3] Percent of Total AUMs = Estimated Forage lost (AUMs) / Total Livestock AUMs

Other direct and indirect impacts to range resources would include: 1) increased potential for the disruption of livestock operations; 2) increased oil and gas development-related traffic in allotments and potential impacts to range improvements; and 3) decreased quality and quantity of forage due to potential noxious weed infestations. These impacts would be similar to those as described for the Proposed Action, but of a reduced magnitude. For this reason, implementation of Alternative B is expected to have only minimal direct and indirect impacts on range resources.

4.8.1.3 Alternative C – Field-Wide Electrification

Direct and indirect impacts to range resources under Alternative C would be nearly identical to those under the Proposed Action. The extent of the impacts to range resources would be the greatest under Alternative C, as approximately 25 percent more acres of vegetation would be affected than under the Proposed Action. Implementation of Alternative C would result in the direct disturbance of 20,112 acres[6] of vegetation, of which 18,395 acres would occur within portions of the six grazing allotments contained wholly or partially within the MBPA (see **Table 4.8.1.3-1**). This would result in a total loss of approximately 2,044 AUMs, which is approximately 2 percent greater than what would be lost under the Proposed Action.

[6] This surface disturbance calculation is based on vegetation layers in GIS shapefiles and is very likely an overestimate given the amount of acreage within the MBPA that has previously been disturbed.

TABLE 4.8.1.3-1
AMOUNT OF FORAGE LOST (AUMS) BY GRAZING ALLOTMENT IN THE MBPA UNDER ALTERNATIVE C – FIELD-WIDE ELECTRIFICATION

Grazing Allotment	Total Livestock AUMs[1]	Calculated AUMs[1]		Alternative C – Field-wide Electrification		
		In MBPA	Carrying Capacity (AUM/Ac)	Estimated Surface Disturbance	Forage Lost (AUMs)[2]	Percent of Total AUMs[3]
Antelope Powers	4,463	3,905	9	6,797	755.2	17.0
Castle Peak	4,760	2,498	9	4,213	468.1	10.0
Eightmile Flat	4,266	4,262	9	4,602	511.3	12.0
Little Desert	3,804	166	9	304	33.8	0.9
Wells Draw	1,220	295	9	386	42.9	3.5
Wetlands	1,666	1,388	9	2,093	232.6	14.0
Total	**20,179**	**12,514**	**--**	**18,395**	**2,043.9**	**$\bar{x}$=9.6**

Note: Existing BLM data indicates that the average carrying capacity for the MBPA is about 9 AUMs/Acre. This carrying capacity may be too optimistic in light of the current development and prolonged dry periods affecting the MBPA given the ESD for the area. For the purpose of analysis, 9 AUMs/Ac will be used as the basis for consistency between the alternatives presented in the EIS and BLM's 2012 FEIS for Gasco Energy, which an area similar to the MBPA.
[1] Refer to **Table 3.8.2-1**
[2] Forage Lost = Estimated Surface Disturbance / Calculated Carrying Capacity (e.g., Antelope Powers = 6,018 acres/9 AUMs/ac = 668.7 AUMs, etc.)
[3] Percent of Total AUMs = Estimated Forage lost (AUMs) / Total Livestock AUMs

This alternative would have the greatest potential for direct and indirect impacts to range resources among all alternatives considered, because it would have the greatest amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities. Correspondingly, Alternative C would have proportionally higher impacts, including an increased potential for disrupting livestock operations, increased oil and gas development-related traffic in allotments and potential impacts to range improvements, and decreased quality and quantity of forage due to potential noxious weed infestations.

As with the Proposed Action, impacts to rangelands under Alternative C would be minimized as follows:

- Adherence to the Utah BLM Rangeland Health Standards, as required by the Vernal RMP (BLM 2008b);
- Reclamation of surface disturbance associated with the proposed project;
- Implementation of alternatives in accordance with the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a) and;
- Implementation of Newfield's Weed Control Plan (see **Section 2.2.12.5**).

In addition, ACEPMs detailed in **Sections 2.2.12.1.1 and 2.12.2.6**, which include the adherence to posted speed limits, maintenance of the integrity of existing fences, and proper installation and regular maintenance of cattle guards, would ensure management of livestock while on their allotments.

4.8.1.4 Alternative D – Agency Preferred Alternative

Direct and indirect impacts to vegetation resources under Alternative D would be similar in nature and scope to those described for the Proposed Action. However, the magnitude of potential impacts would be less under Alternative D, because 692 fewer oil and gas wells would be drilled, fewer new well pads would be constructed, and the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology.

Implementation of Alternative D would result in the direct disturbance of 9,805 acres[7] of vegetation, of which 9,080 acres would occur within portions of the six grazing allotments contained wholly or partially within the MBPA (see **Table 4.8.1.4-1**). This would result in a total loss of approximately 1,009 AUMs, which is approximately 40 percent less than that lost under the Proposed Action.

TABLE 4.8.1.4-1
AMOUNT OF FORAGE LOST (AUMS) BY GRAZING ALLOTMENT IN THE MBPA UNDER ALTERNATIVE D – AGENCY PREFERRED ALTERNATIVE

Grazing Allotment	Total Livestock AUMs[1]	Calculated AUMs[1]		Alternative D – Agency Preferred Alternative		
		In MBPA	Carrying Capacity (AUM/Ac)	Estimated Surface Disturbance	Forage Lost (AUMs)[2]	Percent of Total AUMs[3]
Antelope Powers	4,463	3,905	9	3,172	352.4	7.9
Castle Peak	4,760	2,498	9	2,621	291.2	6.1
Eightmile Flat	4,266	4,262	9	2,103	233.7	5.5
Little Desert	3,804	166	9	233	25.9	0.7
Wells Draw	1,220	295	9	266	29.6	2.4
Wetlands	1,666	1,388	9	1,136	126.2	7.6
Total	**20,179**	**12,514**	**--**	**9,531**	**1,059.0**	**$\bar{x}$=5.0**

Note: Existing BLM data indicates that the average carrying capacity for the MBPA is about 9 AUMs/Acre. This carrying capacity may be too optimistic in light of the current development and prolonged dry periods affecting the MBPA given the ESD for the area. For the purpose of analysis, 9 AUMs/Ac will be used as the basis for consistency between the alternatives presented in the EIS and BLM's 2012 FEIS for Gasco Energy, which analyzed a similar ecological site as MBPA.
[1] Refer to **Table 3.8.2-1**
[2] Forage Lost = Estimated Surface Disturbance / Calculated Carrying Capacity (e.g., Antelope Powers = 4,302 acres/9 AUMs/ac = 478 AUMs, etc.)
[3] Percent of Total AUMs = Estimated Forage lost (AUMs) / Total Livestock AUMs

This alternative would have the lowest potential for direct and indirect impacts to range resources among all action alternatives considered because it would have the least amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities. Correspondingly, impacts related to livestock operations, oil and gas development-related traffic in

[7] This surface disturbance calculation is based on vegetation layers in GIS shapefiles and is very likely an overestimate given the amount of acreage within the MBPA that has previously been disturbed.

allotments, range improvements, and quality and quantity of forage due to potential noxious weed infestations would be proportionally lower.

As with the Proposed Action, impacts to rangelands under Alternative D would be minimized as follows:

- Adherence to the Utah BLM Rangeland Health Standards, as required by the Vernal RMP (BLM 2008b);
- Reclamation of surface disturbance associated with the proposed project;
- Implementation of alternatives in accordance with the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a) and;
- Implementation of Newfield's Weed Control Plan (see **Section 2.2.12.5**).

In addition, ACEPMs detailed in **Sections 2.2.12.1.1 and 2.2.12.6**, which include the adherence to posted speed limits, maintenance of the integrity of existing fences, and proper installation and regular maintenance of cattle guards, would ensure management of livestock while on their allotments.

4.8.2 Mitigation

In addition to the ACEPMs detailed in **Sections 2.2.12.5** and **2.2.12.6**, as well as adherence to the various aforementioned plans for range health standards and reclamation, the following additional mitigation measures could be applied to reduce residual impacts associated with range resources:

- During the APD permitting process, surveys would be conducted to identify active range improvements, including livestock and wildlife water sources/systems, sheep lambing areas, and shearing areas in coordination with the BLM and the livestock operators. Based on the results of these surveys, no roads, well pads, construction/production facilities, or linear facilities would be placed within 200 meters of range improvements, including livestock and wildlife water sources/systems (not to include antelope guzzlers as proposed by Newfield in **Section 2.2.12.7**). If avoidance is not feasible, features would be relocated to an alternate location per the SMA or AO guidance. Alternate locations would be approved by the BLM on BLM-administered lands, and by appropriate SMA on all other lands.
- Project activities would be coordinated to minimize conflicts with ranching operations. This would include conducting an annual meeting with the BLM and livestock operators to discuss the upcoming year's development activities, to identify potential issues, and to determine potential corrective actions by either the livestock permittee and/or proponent; establishing effective and frequent communication with affected permittees during the year; and scheduling project activities to minimize potential disturbance of livestock activities.
- Damage to livestock and livestock facilities would be reported as quickly as possible to the BLM and to affected livestock operators.
- Operators would develop and employ prevention measures to avoid damaging fences, gates, and cattle guards, including upgrading cattle guard gate widths and load-bearing requirements.
- Speed limits would be followed and signs would be erected in active lambing/calving areas, shipping pastures, or adjacent to working corrals to warn vehicle operators.
- Project activities would adhere to the Utah BLM Rangeland Health Standards, as required by the Vernal RMP (BLM 2008b).

4.8.3 Unavoidable Adverse Impacts

Loss of livestock forage as a result of construction and project development would occur under all alternatives; however, the degree of loss would vary by the level of development set out in the alternatives. Because most of the affected grazing allotments in the MBPA are not intensively managed for livestock (i.e., livestock are allowed to roam freely over their assigned allotments/pastures), there remains an unavoidable increase in the risk of livestock/vehicle collision and a likely unavoidable change in livestock utilization patterns further affecting livestock forage production.

4.8.4 Irretrievable and Irreversible Commitments of Resources

Irretrievable impacts would include the loss of livestock forage for both the short-term and long-term LOP until the disturbed sites are successfully reclaimed, (i.e., returned to pre-disturbance production levels). Irreversible impacts would include any livestock mortality resulting from livestock-vehicle collisions.

4.8.5 Relationship of Short-term Uses to Long-term Productivity

The short-term activities associated with the proposed oil and gas development would reduce the long-term livestock forage productivity on the involved grazing allotment for approximately 50 years. The lost long-term livestock productivity would remain for the LOP and beyond, until reclamation is determined to be successful.

4.9 FISH AND WILDLIFE

4.9.1 Direct and Indirect Impacts

4.9.1.1 Alternative A – Proposed Action

4.9.1.1.1 General Wildlife and Wildlife Habitats

Construction and operation of the proposed project would result in direct and indirect impacts to wildlife and wildlife habitats. The principal impacts to terrestrial wildlife likely to be associated with the Proposed Action include: (1) the loss of certain wildlife habitats due to construction activities such as earth-moving in the vicinity of proposed well pads, access roads, and pipeline corridors; (2) habitat fragmentation; (3) vehicle-related mortality; (4) displacement of some wildlife species; and (5) an increase in the potential for illegal kill and harassment of wildlife. The magnitude of impacts to wildlife and wildlife habitats would depend on a number of factors, including the type and duration of disturbance, the species of wildlife present, time of year, and implementation of mitigation measures.

Implementation of the Proposed Action would result in the direct disturbance of 10,985 acres of vegetation that serves as suitable wildlife habitat[8]. This includes approximately 7,857 acres of scrub/shrub, 1,090 acres of grassland/herbaceous, 677 acres of wetland, 702 acres of barren land vegetation cover types, and an additional 679 acres of previously altered/disturbed lands (excluding 4,892 acres for existing development). Direct disturbance to wildlife habitat includes activities such as ground surface grading and excavation, tree and shrub removal, and/or scraping of road surfaces that disturbs surface and subsurface soils. Each of these activities could effectively remove and/or degrade existing habitat, thereby reducing

[8] Although approximately 16,129 acres of vegetation would be disturbed under the Proposed Action, an estimated 4,892 acres of this total would be associated with existing development and would not be suitable as wildlife habitat.

its availability to local wildlife populations. **Table 4.9.1.1.1-1** summarizes the direct disturbances to suitable wildlife habitat by each alternative.

TABLE 4.9.1.1.1-1
DIRECT DISTURBANCES TO SUITABLE WILDLIFE HABITAT BY ALTERNATIVE

Alternative	Scrub/ Shrub Dist. (acres)	Grassland/ Herbaceous Dist. (acres)	Wetland Dist. (acres)	Barren Land Cover Dist. (acres)	Previously Altered/Dist. Lands Dist. (acres)	Total Suitable Wildlife Habitat Dist. (acres)	Dist. of Existing Dev. (acres)
Alternative A (Proposed Action)	7,857	1,090	677	702	679	10,995	4,892
Alternative B (No Action)	432	49	29	20	96	626	171
Alternative C (Field-wide Electrification)	10,305	1,407	857	861	912	14,342	4,952
Alternative D (Agency Preferred Alternative)	5,852	738	404	354	420	7,768	2,174

Following construction, approximately 6,388 acres of initial disturbance (58 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. These areas would be revegetated with seed mixes approved by the BLM, some of which are specifically oriented to enhance wildlife use. The duration of impacts to vegetation would depend, in part, on the success of mitigation and reclamation efforts and the time needed for natural succession to return revegetated areas to pre-disturbance conditions. Grasses and forbs are expected to become established within the first several years following reclamation; however, an estimated 7 to 10 years would be required for shrub establishment and production of useable forage. Thus, under the Proposed Action, total habitat disturbance would be reduced from approximately 10,995 acres to 4,607 acres.

Permanent and temporary loss of habitat as a result of construction activities could affect some small mammal, reptile, and/or amphibian species with very limited home ranges and mobility. Although there is no way to accurately quantify these effects, the impact is likely to be moderate in the short term and would be reduced over time as reclaimed areas produce suitable habitats. Most of these wildlife species would be common and widely distributed throughout the MBPA. The loss of some individuals as a result of habitat removal would have a negligible impact on populations of these species throughout the region.

Indirect effects due to displacement of wildlife also would occur as a result of construction activities associated with the proposed project. In response to the increase in human activity (e.g., equipment operation, vehicular traffic, and noise), wildlife may avoid or move away from the sources of disturbance to other habitats. This avoidance or displacement could result in underutilization of the physically unaltered habitats adjoining the disturbances. The net result would be that the value of habitats near the disturbances would be decreased, and previous distributional patterns would be altered. The habitats would not support the same level of use by wildlife as before the onset of the disturbance. Additionally, some wildlife could be displaced to other habitats, which could lead to some degree of overuse of, and degradation to, those habitats.

Public vehicle use of roads constructed to access the MBPA can have an additive or possibly a synergistic influence on reducing wildlife use of adjacent habitats, as well as cause additional impacts. Public access to constructed roads in the MBPA would increase the potential for mortality and general harassment of wildlife. Seasonal closures of some existing roads to public use following construction would be one of the most effective measures that could be implemented to offset this impact.

4.9.1.1.2 Big Game

Pronghorn Antelope

The greatest direct impact to pronghorn antelope and other big game under the Proposed Action would be direct habitat loss and fragmentation. The development of wells, access roads, pipelines, and other infrastructure within UDWR-designated, crucial value, year-long habitat for pronghorn would initially result in direct short-term loss of approximately 14,403 acres scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (see **Table 4.9.1.1.2-1**). Following construction, approximately 7,692 acres of initial disturbance (53 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to pronghorn crucial value, year-long habitat associated with implementation of the Proposed Action to approximately 6,711 acres.

The development of wells access roads, pipelines, and other infrastructure within UDWR-designated, year-long substantial habitat for pronghorn would initially result in direct short-term loss of approximately 273 acres of scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (**see Table 4.9.1.1.2-1**). Following construction, approximately 140 acres of initial disturbance (51 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to year-long substantial habitat for pronghorn associated with implementation of the Proposed Action to approximately 133 acres.

ABLE 4.9.1.1.2-1
SURFACE DISTURBANCES TO UDWR-DESIGNATED BIG GAME HABITATS UNDER THE PROPOSED ACTION

Species **Big Game Species**	**Habitat Type** **UDWR-designated Habitat Type**	**Total Habitat in MBPA (Acres)**	**Disturbance Associated with the Proposed Action in MBPA**	
			Initial (short-term) Surface Disturbance (acres)	**Residual (long-term) Surface Disturbance (acres)**
Pronghorn Antelope	Year-long Crucial Habitat	109,833	14,403	6,711
	Year-long Substantial	1,811	273	133
Mule Deer	Winter Substantial	5,248	700	323

Species Big Game Species	Habitat Type UDWR-designated Habitat Type	Total Habitat in MBPA (Acres)	Disturbance Associated with the Proposed Action in MBPA	
			Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)
	Year-long Substantial	1,476	232	117
	Year-long Crucial Habitat	2,276	89	35
Rocky Mountain Elk	Winter Substantial	10,857	1,511	706
	Year-long Crucial Habitat	7,573	1,011	480

Much of this surface disturbance under the Proposed Action would only occur as an expansion of existing infrastructure and in habitats that are already fragmented by past oil and gas activity. In fact, a substantial portion of the seasonal habitats for pronghorn in the MBPA are interspersed with and fragmented by existing oil and gas development (**see Figure 3.9.3.1-1 – Attachment 1**). Approximately 583 miles of roads and pipelines, 1,671 well pads, and facilities are currently located within UDWR-designated habitat for pronghorn within the MBPA, which has resulted in an estimated 3,554 acres of surface disturbance. Under the Proposed Action, an additional 14,676 acres of initial surface disturbance would occur within UDWR-designated habitat for pronghorn antelope - a 413 percent increase over current conditions.

In addition to the direct loss of habitat associated with the development of wells, access roads, and other facilities, disturbances from drilling activities and traffic would affect utilization of the habitat immediately adjacent to these areas. Activities associated with construction, drilling, and travel along project roadways are likely to temporarily displace pronghorn from adjacent habitats, lowering the overall habitat effectiveness of these areas. These zones are not likely to be completely abandoned by these species, but the effective use of these areas could be reduced, depending on a number of factors such as time of year, social structure of individual herds, and whether populations are resident or migratory.

Some studies have documented that pronghorn are able to habituate to oil and gas activity (Segerstrom 1982, Reeve 1984, Alldredge and Deblinger 1988). Pronghorn reactions to road-related disturbances usually vary in response to traffic volumes, and the nature of the response may also depend on whether antelope are resident or migratory. Migratory populations that move into an area are likely to be more vulnerable to disturbance than resident antelope. The rate at which migratory pronghorn can adapt to disturbance related to oil and gas development over time is unknown, but the capacity of resident pronghorn to adapt to such circumstances has been demonstrated (Segerstrom 1982, Reeve 1984, Alldredge and Deblinger 1988).

Furthermore, the level of indirect impacts to antelope as a result of traffic-related disturbance varies with the sex, season, and social structure of the individual herd. Territorial bucks are the most tolerant of vehicular activity, and does without fawns are fairly tolerant as well. Does with fawns, however, are less tolerant of vehicular activity, as are nursery groups of antelope, bachelor buck groups, and mixed groups of multiple males. Time of year and social structure also has a bearing on pronghorn reactions to road-related disturbances. During late fall and into winter, pronghorn tend to aggregate in large herds and are more responsive to disturbance than during the spring and summer, when populations are more fragmented and disjunctive.

Antelope are sensitive to disturbance at or near natal sites, because does tend to isolate themselves for a week prior to fawning. Development in certain areas in the spring might interrupt antelope fawning. Consequently, some reduction in local antelope reproduction could result, but the degree would depend upon the amount of disturbance and the significance of the MBPA as a natal site.

The potential for vehicle collisions with pronghorn during the spring, summer, and fall months would be increased by a commensurate increase in vehicle traffic during construction and would continue (although at a reduced rate) throughout all phases of the well operations. Approximately 583 miles of roads currently exist within UDWR-designated habitat for pronghorn in the MBPA. An increase in the number of miles of roads within the MBPA from the Proposed Action would lead to an increase in pronghorn antelope and other big game fatalities along those roads from vehicle collision. An expanded road network would also make the area more accessible to both legal and illegal hunting, and also deliberate and unintentional harassment of pronghorn and other big game.

Successful interim reclamation of areas not used for production activities and final reclamation efforts could re-establish some pronghorn seasonal ranges over time. Newfield would also construct 10 new antelope guzzlers within the MBPA to help support antelope populations within the region, which have experienced heightened environmental stress resulting from drought conditions. In addition, ACEPMs (refer to **Section 2.2.12.7**) that include measures to reduce speeding on area roads and to prevent harassment and/or poaching of pronghorn and other big game species would further reduce potential impacts associated with the Proposed Action.

Mule Deer

The MBPA supports a year-round resident population of mule deer. However, only 8 percent of the MBPA is classified by the UDWR as mule deer range. Nevertheless, the greatest direct impact to mule deer under the Proposed Action would be direct habitat loss and fragmentation of winter substantial habitat, which includes winter concentration areas. A reduction in the amount of forage availability in these areas could preclude some individuals from accessing habitats specific to their winter migration cycles, which could lead to a decrease in overall production or fitness.

The development of wells, access roads, pipelines, and other infrastructure within UDWR-designated winter substantial habitat for mule deer would initially result in the direct short-term loss of approximately 700 acres of winter substantial habitat within the MBPA (see **Table 4.9.1.1.2-1**). Following construction, approximately 377 acres (54 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial habitat. This would reduce the long-term disturbance to UDWR-designated winter substantial habitat for mule associated with implementation of the Proposed Action to approximately 323 acres.

The development of wells, access roads, pipelines, and other infrastructure within UDWR-designated, year-long, crucial, year-long substantial habitats would initially result in the direct short-term loss of approximately 89 acres of year-long crucial and 232 acres of year-long substantial habitats within the MBPA (see **Table 4.9.1.1.2-1**). Following construction, approximately 54 acres (61 percent) and 115 acres (50 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within year-long crucial f and year-long substantial habitats, respectively. This would reduce the long-term disturbance to UDWR-designated mule deer habitat associated with implementation of the Proposed Action to approximately 35 acres for year-long crucial habitat and 117 acres for year-long substantial habitat.

Substantial value year-long habitat and year-long, crucial habitat for mule deer are associated with agricultural and riparian areas within portions of the Pariette Wetlands. Proposed construction activity within both riparian and agricultural areas would be minimal. Therefore, implementation of the Proposed Action is not expected to have significant effects on direct habitat loss and the fragmentation of substantial value year-long habitat or year-long, crucial habitat for mule deer.

While the extent of seasonal habitats for mule deer is limited within the MBPA, habitats for deer in the MBPA are interspersed with and fragmented by existing oil and gas development (see **Figure 3.9.3.2-1 – Attachment 1**). Approximately 53 miles of roads and 88 well pads are currently located within year-long crucial, year-long substantial, and winter substantial habitat for mule deer within the MBPA. This has resulted in an estimated 190 acres of surface disturbance to UDWR-designated habitat for mule deer within the MBPA. Under the Proposed Action, an additional 1,021 acres of initial surface disturbance would occur within UDWR-designated habitat for mule deer - a 515 percent increase over current conditions.

Under the Proposed Action, impacts to year-long crucial habitat and year-long substantial habitat for mule deer are not expected to affect UDWR's capacity to achieve its population objectives for the Nine Mile Herd Unit, because of the relatively small area involved. For the same reasons, vehicle collisions and poaching/harassment impacts are expected to be minimal and non-significant.

Rocky Mountain Elk

Elk occupy portions of the MBPA and surrounding region on a year-round basis. The primary limiting factors affecting elk populations that use the MBPA are winter range forage availability, displacement from crucial ranges during crucial periods as a result of human activity, and the amount of motorized use, which is a factor of road density, road management, and OHV use.

The development of wells, access roads, pipelines, and other infrastructure would initially result in the direct short-term loss of approximately 1,511 acres of UDWR-designated, winter substantial and 1,011 acres of UDWR-designated, year-long crucial habitats for elk within the MBPA (see **Table 4.9.1.1.2-1**). Following construction, approximately 805 and 531 acres (53 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial and year-long crucial habitats, respectively. This would reduce the long-term disturbance to UDWR-designated elk habitat associated with implementation of the Proposed Action to approximately 706 acres for winter substantial habitat and 480 acres for year-long crucial habitat.

Habitats for elk in the MBPA are interspersed with and fragmented by existing oil and gas development (see **Figure 3.9.3.3-1 – Attachment 1**). Approximately 122 miles of roads and some 326 well pads are currently located within winter substantial and year-long crucial habitats for elk within the MBPA, which has resulted in an estimated 725 acres of surface disturbance. Under the Proposed Action, an additional 2,522 acres of initial surface disturbance would occur within UDWR-designated habitat for elk (a 352 percent increase over current conditions).

A reduction in the amount of forage availability in these areas and disturbance to calving areas and migration corridors could preclude some individuals from accessing habitats specific to their seasonal life cycles, which could lead to a decrease in overall production or fitness. Projected loss of habitat and connectivity under the Proposed Action would likely affect patterns of use in these areas. It is anticipated that the elk usage patterns would decrease initially in areas of development. However, once construction is completed and facilities are put into operation and subsequent human activities reduced, elk use of the area is expected to gradually increase, albeit at lower levels than those before the onset of disturbance. This is supported by Van Dyke and Klein (1996), who found that elk subjected to oil well drilling in Wyoming maintained their fidelity to seasonal and annual ranges, but were observed making use of habitat and topographic features to minimize visual contact with the disturbance and avoiding direct contact with the site of disturbance, which slightly reduced the total area of range that was used.

Construction occurring during the winter months within or near this habitat may have a greater impact than during other times of the year. Elk typically experience physiological stress during the winter, particularly gestating females because they require higher energy levels for survival and successful reproduction. The increased presence of vehicles, equipment, and human activity within the MBPA, combined with the direct removal of forage in wintering habitats, could result in increased energy expenditure by elk during severe winter periods. Impacts to calving elk are unlikely to occur, as the areas representing year-long crucial calving habitat would be closed to construction and development activities from May 15th to June 30th (BLM 2008b).

The Nine Mile Herd Unit has been somewhat controlled by annual harvests. Thus far, changes in environmental factors seem to have little impact on this elk herd, and currently the population (3,100 animals) is estimated to be above the management objective (UDWR 2011a). Therefore, implementation of the Proposed Action is not expected to affect UDWR's capacity to achieve its population objectives for elk within the Nine Mile Herd Unit. For the same reasons, vehicle collisions and poaching/harassment impacts are expected to be minimal and non-significant.

4.9.1.1.3 Upland Game

The principal impacts to upland game likely to be associated with the Proposed Action include: (1) direct habitat loss and fragmentation; (2) displacement of some upland game species; (3) vehicle-related mortality; and (4) an increase in the potential for illegal kill and harassment of upland game. The magnitude of impacts to upland game and their habitats would depend on a number of factors, including the type and duration of disturbance, the species of upland game present, and time of year.

Implementation of the Proposed Action would result in the direct disturbance of 11,163 acres of suitable habitat for upland game. Much of this surface disturbance would only occur as an expansion of existing infrastructure and in habitats that are already fragmented by past oil and gas activity. In fact, a substantial portion of the suitable habitats for upland game in the MBPA are interspersed with and fragmented by existing oil and gas development. Approximately 583 miles of roads and pipelines, 1,671 well pads, and facilities are currently located within the MBPA. This has resulted in an estimated 3,724 acres of surface disturbance to potential habitat for upland game within the MBPA. Under the Proposed Action, an additional 11,163 acres of initial surface disturbance would occur within suitable habitat for upland game (a 226 percent increase over current conditions).

Visual and auditory impacts related to construction, drilling, and completion activities could lead to displacement from suitable foraging and nesting habitats (Endrulat et al. 2005). Displaced game birds could move to areas of less suitable habitat, where levels of competition for resources may be higher.

Construction, drilling, and completion activities that take place during the spring or summer months could lead to decreased reproductive success, nest abandonment, or direct impacts to nest sites. Increased construction of roads and vehicle traffic within the MBPA could also lead to increased potential for vehicle collisions with upland game species. Increased access and human presence within the MBPA has the potential to increase poaching and harassment of upland game, as well as increase hunter access and success.

Although the Proposed Action may affect individuals of various upland game species, it would not be expected to adversely affect species population levels as a whole, nor would it affect UDWR's capacity to achieve its population objectives for upland game species.

4.9.1.1.4 Waterfowl

Wetland habitats, including North American arid west emergent marsh and lacustrine and riverine deep-water habitats, that could be used by waterfowl are found within the Pariette Wetlands ACEC and along the Green River, including the Pariette Wetlands and Green River BHCAs. These habitats, used by waterfowl for feeding, resting, and loafing, are generally located away from proposed disturbances and would not be subject to direct impacts from the implementation of the Proposed Action.

While many waterfowl species nest in upland areas, no adverse impacts to nesting waterfowl are expected as a result of direct habitat disturbance to grassland/herbaceous vegetation under this alternative. This is because the area is not recognized as an important nesting area for waterfowl, a relatively small total area of upland habitats adjacent to wetlands are involved, and grassland/herbaceous habitats similar to those impacted are readily available in surrounding areas.

However, direct impacts to waterfowl could result from increased levels of human activity and noise in close proximity to habitats used by waterfowl. This could lead to temporary displacement or avoidance of the affected area. Displacement also could lead to increased use of adjacent habitats, which could lead to increased inter- and intra-specific competition for resources. As increased noise levels and visual disturbances associated with construction and drilling activities would be localized and short-term, displacement to adjacent habitats would likely be temporary in nature and would not likely alter the use of specific wetland habitats or productivity of current waterfowl populations within the MBPA.

Potential indirect impacts to waterfowl habitat, including the BHCAs, could result under the Proposed Action from increased soil erosion, sediment yield, degradation of surface water quality, and potential for spills and leaks. These impacts would be reduced with interim reclamation, recommended mitigation measures for erosion control to avoid or minimize soil erosion and off-site deposition, and spill containment measures.

4.9.1.1.5 Migratory Song Birds

Impacts to migratory song birds in the MBPA under the Proposed Action would be similar for all migratory bird species, but would vary by species depending on loss of habitat types (i.e., loss of vegetation communities) and species' sensitivities to disturbance. Implementation of the Proposed Action would likely have the greatest effect on those species classified as priority bird species by Utah Partners in Flight (UPIF) or the Intermountain West Joint Venture, due to their small population sizes and limited distribution, or those located within the Pariette Wetlands and Green River BHCAs. For the purposes of this EIS, impacts to migratory birds within the MBPA as a whole (i.e., analyses are not broken out by species); however, estimates of surface disturbance in vegetation communities that provide habitat for migratory birds are summarized in **Section 4.7**. The direct removal or fragmentation of vegetative communities used by migratory birds would persist for the LOP, until successful reclamation is achieved. Successful reclamation, in conjunction with weed control efforts, would restore loss of nesting and foraging habitat for migratory birds over time.

The intensity of impacts from the Proposed Action on migratory birds that use the MBPA and surrounding region would largely depend upon seasonal timing of construction, drilling, and completion activities. If construction and drilling of the proposed well pads and wells were completed in the late summer months (i.e., August – September), many of the migratory species will have left the immediate MBPA for southern wintering grounds, or at least will have fledged and left their nests. Disturbance during this time would be temporary, and project-related impacts would not likely have an appreciable impact on migratory bird populations as a whole or individual species in general. If the proposed well construction and drilling were to occur during the peak nesting months in spring/summer, the Proposed Action could result in at least some degree of nest abandonment, direct mortality, reproductive failure, displacement of birds, and destruction of nests. This would have a greater impact on High-Priority migratory bird species that may be nesting in the MBPA, due to the smaller population size and limited distribution of these species.

Construction, drilling, and completion activities, as well as production and maintenance activities, would result in the fragmentation of habitat and associated edge avoidance by migratory birds, which has been documented as leading to lower levels in productivity (Renfrew et al. 2005). Associated noise and increased human presence would cause displacement from foraging and nesting habitats. If displaced, birds could move to less suitable habitats, which could cause an increase in competition and deteriorated physical condition. Increased roads and vehicle traffic levels could lead to the increased potential for collisions between migratory birds and vehicles. However, as mentioned previously, much of the surface disturbance under the Proposed Action would only occur as an expansion of existing infrastructure and in locations where birds either already encounter visual and noise disruptions, or have previously abandoned these areas altogether.

Additionally, reserve pits have the potential to contain wastewater with salts and brines, organic chemicals, petroleum hydrocarbons, surfactants, of substances, which may pose a risk to migratory birds and other wildlife. These materials can be hazardous to birds through ingestion or through loss of insulation due to residue on feathers. Although these pits are small and temporary, the simultaneous presence of large numbers of open pits on the landscape would present a potentially significant cumulative hazard to migratory birds and other wildlife. Measures to cover or net pits or tanks would be one of the most effective measures to offset this impact.

4.9.1.1.6 Raptors

The principal impacts of the Proposed Action on raptors are: (1) nest desertions and/or reproductive failure caused by project-related disturbances; (2) increased public access and subsequent human disturbance resulting from new road construction; and (3) temporary reductions in prey populations. Impacts to raptors in the MBPA under the Proposed Action would generally be similar for all raptor species, but would vary depending on type of habitat impacted (i.e., type of vegetation community) and individual species' sensitivities to disturbance. Impacts would also vary depending on the seasonal timing of construction, drilling, and completion activities, because some raptors are year-round residents while others are seasonal migrants present only during the breeding season or winter.

Direct impacts to raptors could result from surface-disturbing activities or areas with concentrated human activity in close proximity to an active raptor nest. This could lead to temporary displacement from nesting sites, avoidance of affected areas, and deterrence from establishing other nesting sites. Steidl and Anthony (2000) suggest that the greatest energetic costs from disturbance occur in nestlings, potentially decreasing overall reproductive success. Displacement could also lead to increased use of adjacent habitats, which could lead to increased inter- and intra-specific competition for resources. However, not all raptor species are equally as sensitive to disturbance. Some individual and breeding pairs of raptors appear relatively unperturbed by some human disturbance and human-induced impacts and continue to breed successfully amid these activities (Mathisen 1968, Bird et al. 1996). Nesting within or near human-altered environments may be a manifestation of the decreased availability of high-quality natural nest sites, which are indicative of high densities of breeding birds, suggestive of abundant or available prey, or simply a display of higher tolerance for disturbance by certain individuals or breeding pairs.

It is worth noting that much of the surface disturbance under the Proposed Action would only occur as an expansion of existing infrastructure and in habitats that are already fragmented by past oil and gas activity. In fact, a substantial portion of the MBPA is interspersed with and fragmented by existing oil and gas development. Approximately 583 miles of roads and pipelines, 1,671 well pads, and numerous facilities are currently located within the MBPA. The gradual transformation and degradation of habitats within the MBPA from past oil and gas activity is likely a contributing factor in the decline in the level and success of raptor nesting activity and subsequent loss of many historically occupied raptor nests within the MBPA. Of the 197 raptor nests identified within the MBPA, only 21 percent were active for at least some time during the period from 2006 to 2008 (BLM 2009).

Much of the surface disturbance under the Proposed Action would occur in locations where raptors already encounter at least some degree of visual and noise disruptions. In addition, as increased noise levels and visual disturbances associated with construction and drilling activities would be localized and short-term, displacement to adjacent habitats would likely be temporary in nature and would not likely alter the productivity of current raptor populations within the MBPA. In addition, the topography (e.g., mesa tops, cliff faces, rock outcrops) in which most identified raptor nest sites are located precludes the development of proposed facilities in the immediate vicinity of these areas.

The creation of new roads outlined in the Proposed Action would increase public access to areas within the MBPA. With increased use of the MBPA by both workers and recreationists, the potential for encounters between raptors and humans would also increase, which could result in increased disturbance to nests and foraging areas, vehicle collisions, and shooting incidents.

The development of proposed well pads, associated roads and pipelines, and other facilities would initially disturb an estimated 10,895 acres of potential habitat for several species of small mammals that serve as prey for raptors. This short-term moderate impact would affect approximately 10 percent of the MBPA and is not likely to be the determining factor in the level of use the MBPA receives by raptors, because the small amount of short-term change in prey base populations created by the construction associated with the Proposed Action is minimal in comparison to the overall status of the rodent and lagomorph cycles, which is controlled over the region and state by natural forces.

While prey populations on the MBPA would likely sustain some stress during the initial phase of the project, prey numbers would be expected to soon rebound to pre-disturbance levels, following reclamation of approximately 51 percent of the total initial disturbance area that involves pipelines, unused portions of well pads and roads, and wells that are no longer productive. Once reclaimed, these areas would likely promote an increased density and biomass of small mammals that is comparable to those of undisturbed areas (Hingtgen and Clark 1984). For these reasons, implementation of the Proposed Action is not expected to produce any appreciable long-term negative changes to the raptor prey base within the MBPA.

Prior to any new surface disturbance, formal raptor surveys would be conducted to search for possible undocumented nests and to provide needed information on the current activity status of nests on and adjacent to the MBPA. The surveys would be conducted by a BLM-approved biologist in all areas scheduled for construction. If an occupied nest is found, construction would be postponed until after the young have fledged and left the nest, generally accepted to be August 31 (refer to ACEPM in **Section 2.2.12.7**). Newfield could also implement all raptor-specific BMPs outlined within the Vernal RMP. As stated in **Section 2.2.12.7**, Newfield would conduct annual surveys for raptors within already developed areas to assist the BLM in data collection and raptor population tracking within the Project Area.

Consideration of topography and vegetative screening when locating well pads and project-related facilities could further reduce or minimize indirect impacts to raptor species within the MBPA. Successful interim reclamation of areas not used for production activities, as well as final reclamation efforts, could re-establish some raptor and prey habitat over time. Measures to reduce speeding and removal of carrion on area roads could reduce direct impacts to raptors associated with the Proposed Action.

4.9.1.2 Alternative B – No Action Alternative

4.9.1.2.1 General Wildlife and Wildlife Habitats

Direct and indirect impacts to general wildlife and wildlife habitats within the MBPA under the No Action Alternative would be similar in nature and scope as those described under the Proposed Action. However, the magnitude of potential impacts under the No Action Alternative would be substantially lower, because only 788 new oil and gas wells would be developed within the MBPA. This includes proposed wells on State and private lands, as well as those previously approved under the August 2005 ROD for the Castle Peak and Eightmile Flat Oil and Gas Expansion EIS.

Implementation of Alternative B would result in the direct disturbance of 626 acres of vegetation that serves as suitable wildlife habitat[9], which is 94 percent less than that affected by the Proposed Action. This includes approximately 432 acres of scrub/shrub, 49 acres of grassland/herbaceous, 29 acres of wetland, 20 acres of barren land vegetation cover types, and an additional 96 acres of altered/disturbed lands (excluding 171 acres of existing development). Following construction, approximately 185 acres of initial disturbance (23 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. What remains after successful interim reclamation would be a long-term disturbance of approximately 612 acres, or 0.4 percent of the MBPA for the estimated 28- to 38-year LOP.

4.9.1.2.2 Big Game

As with the Proposed Action, the principal direct impacts to big game species under Alternative B would include direct habitat loss resulting in decreased forage availability, displacement from crucial ranges during crucial periods as a result of increased human activity, and an increase in the potential for vehicle collisions and illegal kill and harassment of big game. The magnitude of these impacts would depend on a number of factors, including the type and duration of disturbance, the species of big game present, time of year, and implementation of recommended and required mitigation measures.

[9] Although approximately 870 acres of vegetation would be disturbed under the No Action Alternative, an estimated 171 acres of this total would be associated with existing development and would not be suitable as wildlife habitat.

Pronghorn Antelope

Under Alternative B, the development of these well pads, access roads, pipelines, and other infrastructure within UDWR-designated, crucial value, year-long habitat for pronghorn would initially result in direct short-term loss of approximately 656 acres of year-long scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (see **Table 4.9.1.2.2-1**). Following construction, approximately 145 acres of initial disturbance (22 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to pronghorn crucial value, year-long habitat associated with implementation of the No Action Alternative to approximately 511 acres. No UDWR-designated, year-long substantial habitat for pronghorn would be impacted under Alternative B.

Under Alternative B, impacts to year-long crucial habitat for pronghorn is not expected to affect UDWR's capacity to achieve its population objectives for the Nine Mile Herd Unit, because of the relatively small area involved. For the same reasons, disturbance effects, vehicle collisions, and poaching/harassment impacts are expected to be minimal and non-significant.

Mule Deer

Under Alternative B, the development of ell pads, access roads, pipelines, and other infrastructure within UDWR-designated winter substantial and year-long substantial habitats would initially result in the direct short-term loss of approximately 55 acres and 66 acres of these habitats, respectively. (See **Table 4.9.1.2.2-1.**) Following construction, approximately 18 (33 percent) and 20 acres (30 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial habitat and year-long substantial habitat, respectively. This would reduce the long-term disturbance to UDWR-designated mule deer habitat associated with implementation of the No Action Alternative to approximately 37 acres for winter substantial habitat and 46 acres for year-long substantial habitat. Less than 1 acre of disturbance would occur within year-long crucial habitat for mule deer.

TABLE 4.9.1.2.2-1
SURFACE DISTURBANCES TO UDWR-DESIGNATED BIG GAME HABITATS UNDER ALTERNATIVE B - NO ACTION ALTERNATIVE

Big Game Species	UDWR-designated Habitat Type	Total Habitat in MBPA (Acres)	Disturbance Associated with the No Action Alternative in the MBPA	
			Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)
Pronghorn Antelope	Year-long Crucial Habitat	109,833	656	511
	Year-long Substantial	1,811	--	--
Mule Deer	Winter Substantial	5,248	55	37
	Year-long Substantial	1,476	66	46

Big Game Species	UDWR-designated Habitat Type	Total Habitat in MBPA (Acres)	Disturbance Associated with the No Action Alternative in the MBPA	
			Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)
	Year-long Crucial Habitat	2,276	< 1	< 1
Rocky Mountain Elk	Winter Substantial	10,857	61	53
	Year-long Crucial Habitat	7,573	104	69

Under the No Action Alternative, impacts to UDWR-designated seasonal habitat for mule deer are not expected to affect UDWR's capacity to achieve its population objectives for the Nine Mile Herd Unit, because of the relatively small area involved. For the same reasons, disturbance effects, vehicle collisions, and poaching/harassment impacts are expected to be minimal and non-significant for mule deer under this alternative.

Rocky Mountain Elk

Under Alternative B, the development of wells, access roads, pipelines, and other infrastructure within UDWR-designated, year-long crucial habitat for elk would initially result in the direct short-term loss of approximately 61 acres of winter substantial and 104 acres of year-long crucial habitats within the MBPA. (Refer to **Table 4.9.1.2.2-1.**) Following construction, approximately 8 acres (13 percent) and 35 acres (34 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial habitat and year-long crucial habitat, respectively. This would reduce the long-term disturbance to UDWR-designated elk habitat associated with implementation of the No Action Alternative to approximately 53 acres for winter substantial habitat and 69 acres for year-long crucial habitat.

Additionally, the population is estimated to be above the management objective. Therefore, implementation of the No Action Alternative is not expected to affect UDWR's capacity to achieve its population objectives for elk within the Nine Mile Herd Unit. For the same reasons, vehicle collisions and poaching/harassment impacts are expected to be minimal and non-significant for elk under this alternative.

4.9.1.2.3 Upland Game

Direct and indirect impacts to upland game species under the No Action Alternative would be similar in nature and scope as those described under the Proposed Action. However, the magnitude of potential impacts under the No Action Alternative would be substantially lower, since 4,962 fewer new oil and gas wells would be developed, 537.5 fewer miles of roads and pipelines would be constructed, and 50 fewer central facilities would be built than under the Proposed Action.

4.9.1.2.4 Waterfowl

Direct and impacts to waterfowl under the No Action Alternative would be similar in nature and scope to those discussed under the Proposed Action. However, the magnitude of impacts related to direct habitat loss and displacement to waterfowl would be considerably less under the No Action Alternative.

4.9.1.2.5 Migratory Birds

Direct and indirect impacts to migratory birds under the No Action Alternative would be similar in nature and scope as those described under the Proposed Action. However, the magnitude of potential impacts under the No Action Alternative would be substantially lower, since 4,972 fewer new oil and gas wells would be developed, 537.5 fewer miles of roads and pipelines would be constructed, and 50 fewer central facilities would be built than under the Proposed Action. As with the Proposed Action, the intensity of impacts from on migratory birds that use the MBPA and surrounding region would largely depend upon seasonal timing of construction, drilling, and completion activities.

4.9.1.2.6 Raptors

As with the Proposed Action, the principal direct and indirect impacts to raptors under the No Action Alternative would include an increased potential for nest desertions and/or reproductive failure caused by project-related disturbances, increased human disturbance resulting from new road construction, and temporary reductions in prey populations. The nature and scope of these impacts would generally be similar to those described for the Proposed Action, but the magnitude of impacts would be substantially lower, as approximately 10,269 fewer acres of suitable habitat for prey species would be disturbed under the No Action Alternative as compared to the Proposed Action. This alternative, therefore, would have the lowest potential for impacts to raptors of any alternative considered.

4.9.1.3 Alternative C – Field-Wide Electrification

4.9.1.3.1 General Wildlife and Wildlife Habitats

Direct and indirect impacts to general wildlife and wildlife habitats under Alternative C would be similar to those as the Proposed Action, except that Alternative C would have an additional 3,447 acres of surface disturbance to suitable habitat, due to the installation of transmission lines and substations. This alternative would have the greatest potential for direct and indirect impacts to general wildlife and wildlife habitats among all alternatives considered, because it would have the greatest amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities.

Implementation of the Alternative C would result in the direct disturbance of 14,342 acres of vegetation that serves as suitable wildlife habitat[10], which is 32 percent greater than the acreage affected by the Proposed Action. This includes approximately 10,305 acres of scrub/shrub, 1,407 acres of grassland/herbaceous, 857 acres of wetland, 861 acres of barren land vegetation cover types, and an additional 912 acres of previously altered/disturbed lands (excluding 4,952 acres of existing development). Following construction, approximately 7,893 acres of initial disturbance (55 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational

[10] Although approximately 19,294 acres of vegetation would be disturbed under Alternative C, an estimated 4,952 acres of this total is associated with existing development and is suitable as wildlife habitat.

purposes would be reclaimed. What remains after successful interim reclamation would be a long-term disturbance of approximately 6,459 acres, or 5 percent of the MBPA for the estimated 41- to 51-year LOP.

4.9.1.3.2 Big Game

As with the Proposed Action, the principal direct impacts to big game species under Alternative C would include direct habitat loss resulting in decreased forage availability, displacement from crucial ranges during crucial periods as a result of increased human activity, and an increase in the potential for vehicle collisions and illegal kill and harassment of big game. The magnitude of these impacts would generally be greater than those under the Proposed Action and would depend on a number of factors, including the type and duration of disturbance, the species of big game present, time of year, and implementation of recommended and required mitigation measures.

Pronghorn Antelope

Under Alternative C, the development of wells, access roads, pipeline, and other infrastructure within UDWR-designated, crucial value, year-long habitat for pronghorn antelope would initially result in direct short-term loss of approximately 17,818 acres of year-long scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (see **Table 4.9.1.3.2-1**). Following construction, approximately 8,804 acres of initial disturbance (45 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to pronghorn crucial value, year-long habitat associated with implementation of Alternative C to approximately 9,014 acres.

The development of wells, access roads, pipelines, and other infrastructure within UDWR-designated, year-long substantial habitat for pronghorn would initially result in direct short-term loss of approximately 368 acres of scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (see **Table 4.9.1.3.2-1**). Following construction, approximately 194 acres of initial disturbance (53 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to year-long substantial habitat for pronghorn associated with implementation of Alternative C to approximately 174 acres.

For the same reasons as described under the Proposed Action, disturbance effects, vehicle collisions, and poaching/harassment impacts are expected to be minimal and non-significant for pronghorn antelope under this alternative.

Mule Deer

Implementation of Alternative C would initially result in the direct short-term loss of approximately 905 acres of winter substantial and 296 acres of year-long substantial UDWR-designated habitats for mule deer within the MBPA (see **Table 4.9.1.3.2-1**). Following construction, approximately 483 acres (53 percent) and 153 acres (52 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial and year-long substantial habitat, respectively. This would reduce the long-term disturbance to UDWR-designated mule deer habitat associated with implementation of the Alternative C to approximately 422 acres for winter substantial habitat and 143 acres for year-long substantial habitat.

TABLE 4.9.1.3.2-1
SURFACE DISTURBANCES TO UDWR-DESIGNATED BIG GAME HABITATS UNDER ALTERNATIVE C - FIELD-WIDE ELECTRIFICATION

Big Game Species	UDWR-designated Habitat Type	Total Habitat in MBPA (Acres)	Disturbance Associated with Alternative C in the MBPA	
			Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)
Pronghorn Antelope	Year-long Crucial Habitat	109,833	17,818	9,014
	Year-long Substantial	1,811	368	174
Mule Deer	Winter Substantial	5,248	905	422
	Year-long Substantial	1,476	196	143
	Year-long Crucial Habitat	2,276	130	62
Rocky Mountain Elk	Winter Substantial	10,857	1,882	1,006
	Year-long Crucial Habitat	7,573	1,271	605

The development of well pads, access roads, pipelines, and other infrastructure would initially result in the direct short-term loss of approximately 130 acres of year-long crucial habitat within the MBPA. (See **Table 4.9.1.3.2-1.**) Following construction, approximately 68 acres (52 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial habitat. This would reduce the long-term disturbance to UDWR-designated, year-long crucial habitat for mule deer associated with implementation of Alternative C to approximately 62 acres.

Rocky Mountain Elk

The development associated with Alternative C would initially result in the direct short-term loss of approximately 1,882 acres of winter substantial and 1,271 acres of year-long crucial habitats for elk within the MBPA (refer to **Table 4.9.1.3.2-1**). Following construction, approximately 876 acres (47 percent) and 666 acres (52 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial and year-long crucial habitats, respectively. This would reduce the long-term disturbance to UDWR-designated elk habitat associated with implementation of Alternative C to approximately 1,006 acres for winter substantial and 605 acres for year-long crucial habitat.

The Nine Mile Herd Unit population is estimated to be above the management objective. Therefore, implementation of Alternative C is not expected to affect UDWR's capacity to achieve its population objectives for elk within the Nine Mile Herd Unit. For the same reasons, vehicle collisions and poaching/harassment impacts are expected to be minimal and non-significant for elk under this alternative.

4.9.1.3.3 Upland Game

Direct and indirect impacts to upland game species under Alternative C would be similar to those described for the Proposed Action, except that Alternative C would have an additional 3,447 acres of surface disturbance occurring in suitable habitats, due to the installation of transmission lines and substations.

4.9.1.3.4 Waterfowl

Direct and indirect impacts to waterfowl under Alternative C would be similar in nature and scope to those described for the Proposed Action, but would be greater in magnitude as Alternative C proposes an additional 3,447 acres of surface disturbance over the Proposed Action.

4.9.1.3.5 Migratory Birds

Although greater in overall magnitude, direct and indirect impacts to migratory birds under Alternative C would be similar in nature and scope to those described for the Proposed Action. However, under Alternative C, there would be an increased risk of bird collisions with power lines. While collisions with power lines are a well-documented source of mortality for many migratory bird species, it is difficult to extrapolate collision risk from one power line study and apply or compare it with other studies because of site-specific conditions and the lack of standard study methods, which result in variability of reported mortality rates. Species of birds reported to be susceptible to collisions generally have a large body size, long wing span, heavy body, and poor maneuverability. Flight behavior and other biological attributes contribute to species risk (Avian Power Line Interaction Committee [APLIC] 2012).

However, collision impacts are expected to be minimal and non-significant under this alternative, because design and engineering strategies for minimizing collision risk with power lines would follow criteria presented in *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012).

4.9.1.3.6 Raptors

As with the Proposed Action, the principal direct and indirect impacts to raptors under Alternative C would include an increased potential for nest desertions and/or reproductive failure caused by project-related disturbances, increased human disturbance resulting from new road construction, and temporary reductions in prey populations. The scope and magnitude of these impacts would be greater than those described for the Proposed Action, as Alternative C proposes an additional 3,447 acres of surface disturbance.

Additionally, new power lines used to serve facilities and wells under Alternative C would pose an increased risk of electrocution and collision hazard to raptors. Electrocution is a well-documented source of mortality for raptors, and the vast majority of electrocutions involve electric distribution lines rather than high voltage transmission lines (APLIC 2006). Potential impacts from increased risk of electrocution would be mitigated by designing poles according to criteria presented in *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (APLIC 2006). In addition, strategies for minimizing collision risk with power lines would follow criteria presented in *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012).

4.9.1.4 Alternative D – Agency Preferred Alternative

4.9.1.4.1 General Wildlife and Wildlife Habitats

Direct and indirect impacts to general wildlife and wildlife habitats under Alternative D would be similar in nature and scope to those described for the Proposed Action. However, the magnitude of potential impacts would be considerably less under Alternative D, as fewer new well pads would be constructed and the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology. This alternative would have the lowest potential for direct and indirect impacts to general wildlife and wildlife habitats among all action alternatives considered, because it would have the lowest level of surface disturbance and habitat fragmentation associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities.

Implementation of Alternative D would result in the direct disturbance of 9,940 acres of vegetation that serves as suitable wildlife habitat[11], which is nearly one-third (37 percent) of that compared to the Proposed Action. This includes approximately 5,852 acres of scrub/shrubland, 738 acres of grassland/herbaceous, 403 acres of wetlands, 354 acres of barren land, and 2,594 acres of altered or disturbed (including 806 acres of existing disturbance) vegetation cover types. Following construction, approximately 5,146 acres of initial disturbance (52 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. What remains after successful interim reclamation would be a long-term disturbance of approximately 4,794 acres, or 4 percent of the MBPA for the estimated 41- to 51-year LOP.

4.9.1.4.2 Big Game

As with the Proposed Action, the principal direct impacts to big game species under Alternative D would include direct habitat loss resulting in decreased forage availability, displacement from crucial ranges during crucial periods as a result of increased human activity, and an increase in the potential for vehicle collisions and illegal kill and harassment of big game. However, the magnitude of potential impacts would be the lowest among all action alternatives considered, because it would have the least amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities.

Pronghorn Antelope

Development under Alternative D would initially result in direct short-term loss of approximately 9,175 acres of crucial value, year-long habitat for pronghorn antelope within the MBPA (see **Table 4.9.1.4.2-1**). Following construction, approximately 4,744 acres of initial disturbance (52 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to pronghorn crucial value, year-long habitat associated with implementation of Alternative D to approximately 4,431 acres.

[11] Although approximately 9,940 acres of vegetation would be disturbed under Alternative D, an estimated 2,174 acres of this total is associated with existing development and is not suitable as wildlife habitat.

TABLE 4.9.1.4.2-1
SURFACE DISTURBANCES TO UDWR-DESIGNATED BIG GAME HABITATS UNDER ALTERNATIVE D – AGENCY PREFERRED ALTERNATIVE

Big Game Species	UDWR-designated Habitat Type	Total Habitat in MBPA (Acres)	Disturbance Associated with Alternative D in the MBPA	
			Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)
Pronghorn Antelope	Year-long Crucial Habitat	109,833	9,175	4,431
	Year-long Substantial	1,811	216	105
Mule Deer	Winter Substantial	5,248	557	267
	Year-long Substantial	1,476	93	37
	Year-long Crucial Habitat	2,276	78	44
Rocky Mountain Elk	Winter Substantial	10,857	918	446
	Year-long Crucial Habitat	7,573	792	390

Development under Alternative D would initially result in direct short-term loss of approximately 216 acres of year-long substantial habitat for pronghorn within the MBPA (see **Table 4.9.1.1.3-1**). Following construction, approximately 111 acres (51 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to year-long substantial habitat for pronghorn associated with implementation of Alternative D to approximately 105 acres.

For the same reasons as described under the Proposed Action, disturbance effects, vehicle collisions, and poaching/harassment impacts are expected to be minimal and non-significant for pronghorn antelope under this alternative.

Mule Deer

Development under Alternative D would initially result in the direct short-term loss of approximately 557 acres of winter substantial and 93 acres of year-long substantial habitats for mule deer within the MBPA (see **Table 4.9.1.4.2-1**). Following construction, approximately 290 acres (52 percent) and 56 acres (60 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial habitat and year-long substantial habitat, respectively. This would reduce the long-term disturbance to UDWR-designated mule deer habitat associated with implementation of Alternative D to approximately 267 acres for winter substantial habitat and 37 acres for year-long substantial habitat.

Development under Alternative D would initially result in the direct short-term loss of approximately 78 acres of year-long crucial habitat for mule deer within the MBPA (see **Table 4.9.1.4.2-1**). Following construction, approximately 34 acres (44 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial habitat. This would reduce the long-term disturbance to UDWR-designated, year-long, crucial habitat for mule associated with implementation of Alternative D to approximately 44 acres.

Similar to the Proposed Action, impacts to UDWR-designated seasonal habitat for mule deer under Alternative D, is not expected to affect UDWR's capacity to achieve its population objectives for the Nine Mile Herd Unit, because of the relatively small area involved. For the same reasons, disturbance effects, vehicle collisions, and poaching/harassment impacts are expected to be minimal and non-significant for mule deer under this alternative.

Rocky Mountain Elk

Development under Alternative D would initially result in the direct short-term loss of approximately 918 acres of winter substantial and 792 acres of year-long crucial habitats for elk within the MBPA (refer to **Table 4.9.1.4.2-1**). Following construction, approximately 472 acres (51 percent) and 402 acres (51 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial habitat and year-long crucial habitat, respectively. This would reduce the long-term disturbance to UDWR-designated elk habitat associated with implementation of Alternative D to approximately 446 acres for winter substantial habitat and 390 acres for year-long crucial habitat.

The population in the Nine Mile Herd Unit is estimated to be above the management objective. Therefore, implementation of Alternative D is not expected to affect UDWR's capacity to achieve its population objectives for elk within the Nine Mile Herd Unit. For the same reasons, vehicle collisions and poaching/harassment impacts are expected to be minimal and non-significant for elk under this alternative.

4.9.1.4.3 Upland Game

Direct and indirect impacts to upland game species under Alternative D would be similar in nature and scope as those described under the Proposed Action. However, the magnitude of potential impacts would be considerably less under Alternative D, as fewer new well pads would be constructed and the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology. This alternative would therefore have the lowest potential for impacts to upland game of any action alternative considered because approximately 6,007 fewer acres would initially be disturbed under Alternative D as compared to those under the Proposed Action.

4.9.1.4.4 4.9.1.4.4 Waterfowl

Direct and impacts to waterfowl under Alternative D would be similar in nature and scope to those discussed under the Proposed Action. However, in comparison, the magnitude of impacts related to direct habitat loss and displacement to waterfowl would be considerably less under Alternative D because of restrictions on development resulting in lower surface disturbance in riparian habitats, floodplains, and the Pariette Wetlands ACEC.

4.9.1.4.5 Migratory Birds

Direct and indirect impacts to migratory birds under Alternative D would be similar in nature and scope to those described under the Proposed Action. However, the magnitude of potential impacts under Alternative D would be substantially lower, because fewer new well pads would be constructed, the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology, and limited surface disturbance and focused use of existing well pads on federal lands within the Pariette Wetlands ACEC. This alternative, therefore, would have the lowest potential for impacts to migratory birds of any action alternative considered, as approximately 6,007 fewer acres would initially be disturbed under Alternative D as compared to those under the Proposed Action. Thus, under this alternative, project-related impacts would not likely have an appreciable impact on migratory bird populations as a whole or individual species in general.

4.9.1.4.6 Raptors

As with the Proposed Action, the principal direct and indirect impacts to raptors under Alternative D would include an increased potential for nest desertions and/or reproductive failure caused by project-related disturbances, increased human disturbance resulting from new road construction, and temporary reductions in prey populations. The nature and scope of these impacts would generally be similar to those described for the Proposed Action, but the magnitude of impacts would be substantially lower because approximately 6,007 fewer acres of suitable habitat for prey species would be disturbed initially under Alternative D, as compared to the Proposed Action.

4.9.2 Mitigation

In addition to the ACPEMs detailed in **Section 2.2.12.7**, as well as compliance with wildlife stipulations outlined in the Vernal RMP (BLM 2008b) and BLM Onshore Order #7, the following mitigation measures could be applied to reduce some residual direct and indirect impacts to wildlife in the MBPA:

- Proposed wells and roads located within pinyon-juniper woodland-dominated habitat would be sited, whenever possible, to reduce the amount of disturbance to mule deer foraging habitat.
- All proposed roads and well pads would be sited as far from permanent water sources as possible.
- All open exhaust stacks would be capped with screen cones to exclude their use by birds and bats.
- All open pits or tanks containing liquids would be covered or netted to exclude their use by birds, bats, and other wildlife.
- All applicable surface stipulations from Appendix K and Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.
- Exploration, drilling, and other development activity would not be conducted within crucial elk calving and deer habitat from May 15 to June 30.
- A Worker Environmental Awareness Program would be implemented for construction and drilling crews prior to the commencement of the project activities. Training materials and briefings would include, but would not be limited to, discussion of the Federal ESA, the consequences of noncompliance with this Act, identification and values of wildlife and natural

plant communities, threatened and endangered species within the MBPA, hazardous substance spill prevention and containment measures, and review of all required and recommended mitigation measures.

4.9.3 Unavoidable Adverse Impacts

Adverse impacts to fish and wildlife species would occur under all of the alternatives to varying degrees, depending on the number of wells. Of the adverse impacts described above, the following impacts would be unavoidable:

- Long-term losses of habitat for general wildlife, big game, upland game species, migratory birds, raptors, and other wildlife.
- Fragmentation of wildlife habitat by roads that include a reduction in the size of contiguous roadless habitat areas.
- Displacement of wildlife species during construction of roads, wells, pipelines, and ancillary features, as well as during well drilling and completion activities.

4.9.4 Irretrievable and Irreversible Commitments of Resources

Any losses of important habitat for wildlife species would be irretrievable until disturbed areas are actively and adequately restored. The fragmentation of wildlife habitat would be irretrievable until these features are removed and reclaimed following project completion. Wildlife mortality due to project activities would be an irreversible impact. In addition, any contamination of wildlife or wildlife habitat would be irretrievable until remediated.

4.9.5 Relationship of Short-term Uses to Long-Term Productivity

Construction of roads, well pads, pipelines, and other facilities would provide a short-term use that would result in long-term loss and fragmentation of wildlife habitat. Indirect effects resulting from increased traffic, as well as legal and illegal hunting, would also have long-term negative impacts on the habitat suitability and productivity of wildlife species in the MBPA. These impacts would decrease the long-term productivity of wildlife habitat within the MBPA, but would not eliminate it.

4.10 SPECIAL STATUS SPECIES AND STATE SPECIES OF CONCERN

4.10.1 Direct and Indirect Effects

In general, construction and operational impacts on special status fish and wildlife species and their habitats would be similar to those discussed in the preceding sections for vegetation communities (**Section 4.7.1**) and wildlife (**Section 4.9.1**). However, these impacts can be more severe for special status plant, fish and wildlife species (including those listed as threatened or endangered under the ESA of 1973, as amended; BLM sensitive species; species proposed for listing; species of special concern; other USFWS or BLM species identified as unique or rare; other UDWR or UNHP species designated as unique or rare), if present, since the distribution and abundance of many of these species are limited in the MBPA and surrounding region. An adverse impact to special status species would be considered to occur if construction and/or operation of any component of the proposed project would cause substantial changes to the existing abundance, distribution, pollinators, or habitat value for a special status plant, fish or wildlife species.

4.10.1.1 Alternative A – Proposed Action

4.10.1.1.1 Species Listed as Federally Threatened, Endangered, or Proposed

The following section describes the anticipated effects of various project components and activities associated with the Proposed Action on federally listed, proposed, and candidate species carried forward for evaluation. The magnitude and nature of effects resulting from implementation of the Proposed Action is assessed for the species relative to existing conditions in terms of whether these effects are expected to appreciably reduce likelihood of species survival and recovery. Conclusions regarding the effects of the Proposed Action on the species, as well as a determination of effect (***no effect***; ***may affect, is not likely to adversely affect***; ***may affect, is likely to adversely affect***; ***is likely to jeopardize proposed species/adversely modify proposed critical habitat***; and ***is not likely to result in a trend towards federal listing of the species***) is presented in the conclusions and determination section at the end of the analysis for the species.

Western Yellow-billed Cuckoo

The Western yellow-billed cuckoo (WYBC) is an obligate riparian species that nests and forages in cottonwood-willow woodlands with a dense sub-canopy. While there is a low potential for the species to occur within the MBPA, their presence within the area cannot be entirely discounted. Riparian habitat that could be used by the WYBC occurs on the eastern edge of the MBPA along the Green River and within isolated portions of Pariette Draw.

The Proposed Action would include the long-term surface disturbance of approximately 20 acres of Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation, which serves as potential nesting and foraging habitat for cuckoo. If development or production activities were to occur during the cuckoo's breeding season (March through July), direct impacts could result in loss of nests, eggs, or young, or the disruption of breeding activities for that season. No surface disturbance would occur within proposed critical habitat for the WYBC.

These habitat areas are located within the 100-year floodplain of Pariette Draw and the Green River in the extreme northeastern corner of the MBPA. Under existing regulations, guidelines, and ACEPMs, well pads and associated roads and pipelines would be located to avoid or minimize impacts in riparian areas and the 100-year floodplain of Pariette Draw and the Green River, and appropriate erosion control and revegetation measures would be employed.

Indirect impacts to the species include displacement due to increased human presence in the area and the associated increase in noise, traffic, and dust levels, and increased invasion of non-native plants into suitable habitat. Invasion of riparian habitats by aggressive non-native species, particularly tamarisk (*Tamarix* species), would adversely impact the species. Other potential indirect impacts to the species include decreased water quality and degradation of riparian vegetation, due to erosion and sedimentation associated with surface disturbance.

ACEPMs and the Mitigation Measures in **Section 4.12.2.5** would reduce direct impacts to suitable habitat and eliminate direct impacts to individual birds; therefore, implementation of the Proposed Action ***is not likely to adversely affect*** the threatened WYBC.

Colorado River Fish Species

Construction and operation of the proposed MBPA would result in direct and indirect impacts to Colorado River endangered fish species (i.e., bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) and their habitats. The principal impacts to these species likely to be associated with the Proposed Action include: (1) flow depletion due to project-related water use; (2) increased sedimentation of the Green River; and (3) an increased risk of accidental spills of pollutants such as natural-gas condensate and oil into the Green River or its tributaries. The magnitude of these impacts to Colorado River endangered fish species would depend on a number of factors, including the type and duration of disturbance, time of year, and implementation of recommended and required mitigation measures.

Water depletion also may affect aquatic habitats and fisheries resources within these watersheds. Water requirements for drilling, hydrostatic testing, dust abatement, and other project activities would be acquired from permitted sources. These sources may include direct withdrawals from the Green River, Pariette Draw, municipal sources, and local supply wells. Existing authorized water usage would directly and indirectly consume water from the Green River and ultimately cause reductions in flow within the Colorado River Basin.

The Colorado River fish are affected by activities that deplete or degrade the flow of downstream waters into the Upper Colorado River Basin (USFWS 1987). In addition to reducing the quantity of water with sufficient quality in a specific location, water depletions can also reduce a river's ability to create and maintain the physical habitat (areas inhabited by, or potentially inhabitable by, special status fish for use in spawning, nursery, feeding, and rearing, or access to these habitats) and the biological environment (food supply, predation, and competition). Water depletions can also contribute to alterations in flow regimes that favor non-native fish that compete with native fish species for resources.

As discussed in **Section 4.6.1.1.1.1.**, it is estimated that total water use in drilling and completion of 5,750 wells under the Proposed Action would be approximately 1,150 acre-feet of water annually. Additionally, it is estimated that Newfield would use approximately 78 acre-feet of water per year for dust abatement during project operations and up to 2,738 acre-feet per year for water-flooding operations. Thus, total water use under the Proposed Action would average approximately 3,966 acre-feet annually over the 20- to 30-year construction and operational period.

On January 22, 1988, a Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) was initiated to address depletion and other impacts to the Colorado River fish. Any water depletions from tributary waters within the Colorado River drainage are considered to "*jeopardize the continued existence*" of these fish under this Recovery Program. A Section 7 agreement was implemented on October 15, 1993, by Recovery Program participants to further define and clarify objectives of the recovery process as stated in the Recovery Program. Incorporated into this agreement was the Recovery Implementation Program Recovery Action Plan (RIPRAP). The RIPRAP identified actions currently believed to be required to recover the Colorado River fish most expeditiously. Included in the RIPRAP was the requirement that a one-time depletion fee would be paid to help support the Recovery Program for all non-historical water depletions from the Upper Colorado River Basin. These depletion fees were intended to be a Reasonable and Prudent Alternative to avoid jeopardy to the endangered Colorado River fish by depletions to the Upper Colorado River Basin. In 1995, USFWS eliminated these water depletion fees for water depletions from the Upper Colorado River Basin of 100 acre-feet per year or less (USFWS 1995b).

Newfield currently has secured water rights for up to 5,106 acre-feet per year. Of this volume, 324 acre-feet are from water sources considered historic depletions under the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (USFWS 1987). Section 7 consultation was completed for all historic depletions in 1993 (USFWS 1993). As part of this consultation, it was determined that historic depletions, regardless of size, do not pay a depletion fee to the Recovery Program. Newfield's additional water sources (WR 41-3530; WR 47-1802; WR 47-1804) are not considered historic depletions and Section 7 consultation with the USFWS is required prior to use of these sources. To date, three consultations have been completed for water depletions associated with oil and gas development projects in the MBPA. Currently, a total annual volume of 3,328 acre-feet has been authorized through these USWFS consultations. (Refer to **Table 2.2.8.4-1.**) Water supply sources used under these previous consultations, plus the historic water rights, equals a total of 3,652 acre-feet of water available for this Project. The additional 314 acre-feet of water needed under the Proposed Action would require additional consultation.

Potential impacts to Colorado River fish from construction and operation of the proposed water collection station would include short-term disturbance of about 1 acre of floodplain habitat, which could result in erosion and sediment yield. Impingement at the intakes is not anticipated as a result of the use of screening. Hydrocarbons located at the nearby (but outside of the floodplain) water processing station would be limited to produced natural gas or NGL that would be used as a fuel source to power the 300-600 hp generator associated with the processing station. Therefore, there is a low risk of leaks or spills from hydrocarbons associated with the water collection station to impact fish.

Implementation of the Proposed Action could also degrade USFWS-designated critical habitat for Colorado River fish in the Green River by increasing erosion and sediment yield. Sediment deposition may bury and suffocate fish eggs and larvae affecting spawning and rearing, while reduced visibility created by sediment load may inhibit the ability of fish to see prey, impacting feeding behavior (USEPA 2003). Physiological impacts, such as gill clogging and the ingestion of large quantities of sediment, could also cause illness, reduced growth, and eventual death (USEPA 2003). Due to existing surface disturbance, ongoing projects, and poor reclamation success of previously disturbed areas within the MBPA and surrounding region, increased erosion and subsequent sediment yield are likely to occur within these watersheds.

Sediment could be delivered to several perennial streams, riparian habitats, and small, ephemeral drainages (i.e., Castle Peak Draw, Wells Draw, Big Wash, Sheep Wash) within the MBPA. Conservatively assuming that all sediment delivered to Pariette Draw and other drainages within the MBPA is eventually transported to the Green River, the Proposed Action would increase sediment loading to the Green River by about 62 tons annually, or by 0.001 percent in the short-term.

Activities within or adjacent to the 100-year floodplains of Pariette Draw and the Green River, or within drainages leading to these watercourses, may increase the potential for a release of contaminants into these areas. Leaks or spills of contaminants may lead to habitat degradation and mortality of fish. The risk of acute or chronic toxicity to endangered fish in the Green River in the event of a natural-gas condensate spill would depend on the location of the spill relative to the main stem Green River. Natural gas condensate contains a variety of lightweight hydrocarbons, of which the most toxic to aquatic biota is the aromatic hydrocarbon fraction (benzene, ethylbenzene, toluene, xylenes). These account for less than 0.5 percent of the volume of condensate (BLM 2005b). Natural-gas condensate is highly volatile and likely to evaporate within approximately 8 hours of spilling (BLM 2005b). Thus, spills occurring in close proximity to the Green River, or in streams with flow rates that would deliver condensate to the Green River prior to evaporation, would pose a risk of exposing Colorado River fish to potentially lethal levels of toxic substances.

Under the Proposed Action, pipelines would cross ephemeral streams at approximately 953 locations within the MBPA. Because the crude oil extracted within the MBPA is solid within the temperature range of the area's climate, oil would not pose a risk of acute toxicity for Colorado River endangered fish in the event of an accidental spill. A catastrophic spill of a 400-barrel (16,800-gallon) condensate tank within the 100-year floodplain of the Green River, while highly unlikely, would have a high probability of producing acutely toxic concentrations of condensate in the Green River, and therefore is considered a possible adverse impact to Colorado River fish. A spill from a condensate tank within the Green River floodplain would constitute the overall worst case scenario under the Proposed Action and would likely result in acute toxicity at some flow levels and an adverse impact to designated critical habitat.

ACPEMs and BMPs for the site-specific use of buried pipelines and centralized water and condensate tank facilities (where they were determined to be appropriate at the site-specific level) would reduce the risk of spills from pipelines and tanks. Burying pipelines would reduce the risk of accidental puncture of pipelines, and central tanks batteries could be located outside the floodplain, greatly reducing the risk of spills affecting the Green River. The risk of a spill from pipelines is considered to be low because proposed mitigation measures described in **Section 4.10.2.3** would preclude the development of wells in the floodplain.

Based on the projected water depletions and the increase in yields of the Green River, implementation of the Proposed Action ***may affect, is likely to adversely affect*** the listed Colorado River fish species, bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker and their habitat. The loss or "take" of an unknown number of individual fish would be anticipated. The potential also exists that portions of the designated critical habitat for these species may be adversely modified.

Uinta Basin Hookless Cactus and Pariette Cactus

Implementation of the Proposed Action would directly result in the disturbance of approximately 7,762 acres of potential habitat for *Sclerocactus* species within the MBPA, which represents approximately 1.7 percent of the total potential habitat for *Sclerocactus* species across their entire range. Following construction, approximately 4,370 acres (56 percent) of land associated with the construction of the well pads, access roads, and pipeline ROWs not needed for operation purposes would be reclaimed. If reclamation is successful, the long-term disturbance to *Sclerocactus* species' habitat under the Proposed Action would be reduced to approximately 3,392 acres.

Development under the Proposed Action would initially result in direct short-term loss of approximately 946 acres of Level 1 core habitat and 1,853 acres of Level 2 core habitat within the MBPA. Following construction, approximately 62 percent of the disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance to Level 1 and 2 Core Conservation Areas under the Proposed Action would be reduced to approximately 250 acres and 776 acres, respectively.

Implementation of the Proposed Action also would increase the potential for occurrence of indirect and dispersed direct effects to *Sclerocactus* species, if present. Disturbances from construction could increase the potential for the invasion and establishment of noxious weed species. Invasion by non-native species is particularly problematic as they are capable of effective competition with native species for space, water, light, nutrients, and subsequent survival. Over time, the successful establishment of non-native species can choke out native vegetation and eventually dominate large areas. An increase in weedy annual grasses also increases the potential for fire by increasing the density and flammability of available fuels. Grasses are more flammable and establish in denser populations than woody and non-woody native vegetation.

Additional indirect construction-related impacts could include an increased potential for wind erosion of disturbed areas, creating airborne dust that could be transported into suitable habitat for these species. Airborne dust generated by vehicles could inhibit photosynthesis and transpiration in these species. Inhibited and reduced rates of photosynthesis could affect the rate of growth, the reproductive capacity of individual plants, and ultimately the ability of these individuals to persist in adjacent areas. Thompson et al. (1984) and Farmer (1993) have indicated that varying amounts of dust settling on vegetation can block stomata, increase leaf temperature, and reduce photosynthesis.

Other indirect impacts to *Sclerocactus* species could include impacts from the use of herbicides to control invasive plants in the MBPA, and possible reductions in pollination or seed dispersal from a larger road network that could result in isolation of populations due to habitat fragmentation and increased dust. Because *Sclerocactus* species require insect pollinators for successful reproduction (Tepedino et al. 2010), impacts to pollinator nesting and foraging habitats can negatively affect the cactus by reducing the diversity and abundance of pollinators, and thereby the plant's ability to successfully reproduce. Expansion of access roads also could also increase the risk of illegal collecting of *Sclerocactus* species.

The species-specific conservation measures for *Sclerocactus* species (**Section 4.10.2**) include provisions to avoid occupied habitat, employ the use of spatial buffers between surface activities and known populations of plants and monitor the effectiveness of these measures. The proposed mitigation measures for *Sclerocactus* species are described in **Section 4.10.2.5**.

Although these measures would minimize the impacts of the action to *Sclerocactus* species, larger landscape-level changes, such as increased habitat fragmentation and habitat loss, pollinator disturbance, changes in erosion and water runoff, and increased weed invasion, cannot be entirely negated. These disturbances could continue to negatively impact *Sclerocactus* species throughout the MBPA. An undetermined number of individual plants could be lost. Therefore, implementation of the Proposed Action ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus and Pariette cactus and their habitats.

Ute Ladies'-tresses

There are no documented occurrences of Ute ladies'-tresses in the MBPA. Habitat for the Ute ladies'-tresses in the MBPA is generally confined to portions of the Pariette Wetlands. Under the Proposed Action, no disturbance is proposed within riparian areas in the Pariette Wetlands ACEC, and 35.2 acres of disturbance is proposed in wetland vegetative cover types in the Pariette Wetlands ACEC. While the presence of wetlands is an important habitat quality for this species, the wetland vegetative cover includes open water and greasewood flats that do not represent suitable habitat for Ute ladies'-tresses. Direct disturbance to potential habitat for this species is unlikely, because very little disturbance to wetlands or riparian floodplains are expected to occur under implementation of the Proposed Action, and because of the conservation measures included in **Section 4.10.2**.

Implementation of the Proposed Action also would increase the potential for occurrence of indirect and dispersed direct effects to Ute ladies'-tresses, if present. Disturbances from construction could increase the potential for the invasion and establishment of noxious weed species. Invasion by non-native species is particularly problematic, as these species are capable of effectively competing with native species for space, water, light, nutrients, and subsequent survival. Over time, the successful establishment of non-native species can choke out native vegetation and eventually dominate large areas. In addition, as previously noted, an increase in weedy annual grasses also increases the potential for fire by increasing the density and flammability of available fuels. Grasses are more flammable and establish in denser populations than woody and non-woody native vegetation. Additional indirect construction-related impacts could include an increased potential for wind erosion of disturbed areas, creating airborne dust that could be transported into suitable habitat for these species. Airborne dust generated by vehicles could inhibit photosynthesis and transpiration in these species. Inhibited and reduced rates of photosynthesis could affect the rate of growth, the reproductive capacity of individual plants, and ultimately the ability of these individuals to persist in adjacent areas. Thompson et al. (1984) and Farmer (1993) have indicated that varying amounts of dust settling on vegetation can block stomata, increase leaf temperature, and reduce photosynthesis.

The species-specific conservation measures for Ute ladies'-tresses include provisions to avoid occupied habitat, employ the use of spatial buffers between surface activities and known populations of plants and monitor the effectiveness of these measures. The proposed mitigation measures for Ute ladies'-tresses are described in **Section 4.10.2.5**.

No loss of individual plants is anticipated through implementation of the Proposed Action; however, the Proposed Action has the potential to disturb suitable habitat for this species. Therefore, the Proposed Action ***may affect, is not likely to adversely affect*** the Ute ladies'-tresses.

4.10.1.1.1 BLM Sensitive Species and Utah State Species of Concern

Fringed Myotis, Spotted Bat, Big Free-tailed Bat, and Townsend's Big-eared Bat

Approximately 7,885 acres (7 percent) of pinyon-juniper woodland, desert shrub and riparian woodland habitats used for foraging by the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat would be disturbed as a result of the Proposed Action. Considering that these species are uncommon in northeastern Utah (Oliver 2000) and that there is a relative abundance of foraging habitat in the adjacent habitats within the MBPA, the loss of foraging habitat is not anticipated to have a significant impact on the fringed myotis, spotted bat, big free-tailed and Townsend's big-eared bat. Additionally, interim reclamation would restore 4,482 acres of foraging habitat, which would reduce the disturbance to 3,403 acres for the remaining LOP.

Under the Proposed Action, approximately 468 acres (0.4 percent) of surface disturbance would occur in potential roosting habitat for the fringed myotis, spotted bat, big free-tailed and Townsend's big-eared bat. This habitat is classified as Colorado Plateau Mixed Bedrock Canyon and Tableland. While cliff and crevice habitats are not typically directly disturbed by construction, development in the vicinity of these habitats is possible.

Indirect impacts to these species are likely to include noise from construction activities, vehicle traffic, and increased human presence. Many bat species are easily disturbed by noise and human presence (Oliver 2000). These species are especially sensitive to disturbance during roosting, maternity, and parturition. Abandonment of roost sites may occur due to increased human presence and noise disturbance (Oliver 2000).

Artificial light used for drilling operations conducted during the evening has the potential to increase both disruption of foraging behavior and the risk of bat predation. Additionally, bats could be attracted to reserve pits by mistaking them for bodies of water. Reserve pits have the potential to contain wastewater with salts and brines, organic chemicals, petroleum hydrocarbons, surfactants, and other substances that may pose a risk to bats and other wildlife. These materials can be hazardous to bats through ingestion or loss of insulation due to residue on fur. Although these pits are small and temporary, the simultaneous presence of large numbers of open pits on the landscape presents a potentially significant cumulative hazard to many bat species and other wildlife. Covering or netting pits or tanks would be one of the most effective measures to offset this impact (see **Section 4.9.2**). By adhering to the stated ACEPMs and successful reclamation, both interim and final, the Proposed Action is ***not likely to result in a trend towards federal listing of the species***.

White-tailed Prairie Dog

Implementation of the Proposed Action would result in the direct disturbance to approximately 1,331 acres (or approximately 14 percent) of mapped white-tailed prairie dog colonies within the MBPA. As discussed in **Section 3.10.2.1.5**, approximately 11,647 acres of prairie dog colonies are mapped within the MBPA. Potential direct adverse impacts to this species associated with oil and gas development include habitat loss due to clearing and crushing of vegetation; fragmentation of available habitat due to pad construction, road development, and well operation; temporary displacement of animals; increased potential for vehicle collisions with prairie dogs; alteration of surface water drainages; and degraded habitat values due to increased soil compaction. Indirect effects to white-tailed prairie dogs include increased shooting pressure caused by improved access into remote areas (Seglund et al. 2004).

Construction activities have the potential to introduce and spread noxious weeds and invasive species. Invasive species may reduce the overall quality of forage for prairie dogs and ultimately may limit prairie dog populations. Specific measures under the Proposed Action, including the ACEPMs for general wildlife and vegetation, would reduce impacts to the white-tailed prairie dog. Successful interim and final reclamation efforts could re-establish some of the white-tailed prairie dog habitat over time. However, impacts to white-tailed prairie dogs are likely to occur due to difficulties with reclamation in the Uinta Basin and a potential increase of weedy species. Weed control would reduce habitat degradation, and ACEPMs to reduce speeding on area roads would lessen the potential for collisions between prairie dogs and vehicles.

In addition, management protections for white-tailed prairie dog colonies contained in the approved Vernal RMP (BLM 2008b) management decisions include provisions to minimize impacts to white-tailed prairie dog colonies within the Myton Complex during construction, which could further reduce impacts related to habitat loss and fragmentation in the MBPA. No long-term population level impacts would be expected from development of the Proposed Action because of prairie dog adaptation to disturbed sites, large amount of remaining habitat, and their tolerance to human activity. Overall, the Proposed Action may directly and indirectly impact individual white-tailed prairie dogs, but ***is not likely to result in a trend towards federal listing of the species***.

Greater Sage-grouse

Oil and gas development can cause sage-grouse populations to decline; however, the specific reasons for declines are still unknown (Braun et al. 2002; Connelly et al. 2000). The primary impacts of development to sage-grouse include direct habitat loss from well pad, road, pipeline and facility construction, as well as avoidance and displacement due to increased human activity and habitat fragmentation. Braun et al. (2002) maintain that oil and gas development may have negative short-term (site construction, drilling, and completion) and long-term (road development) effects.

Numerous citations have linked oil and gas development to declines in sage-grouse populations. For example, Holloran (2005), Doherty et al. (2008), Walker et al. (2007), Lyon and Anderson (2003), and Crompton and Mitchell (2005) have linked population reductions in response to oil and gas development. Sage-grouse exhibit fidelity to traditional winter use areas, and surface disturbance and human activity in these areas may cause sage-grouse to displace to less adjacent habitats, which may not have the desired vegetative cover and/or may leave the species more susceptible to predation.

Additionally, various studies have determined that sage-grouse are affected by human activity (Braun 1986; Lyon and Anderson 2003; Remington and Braun 1991). These studies have determined that hens nested farther away from leks in areas where human disturbance occurred, and that nesting initiation rates were also lower. In addition, it was also determined that male attendance at leks was lower when human activity occurred within 2 miles. The UDWR identified one lek, known as the Myton Bench – Wells Draw lek, near the southwestern portion of the MBPA, approximately 0.5 miles from the nearest proposed development. This lek was last reported as active during the 1999 season, and has since been eliminated and replaced by project facilities. Therefore, there would be no impacts to leks within the MBPA from implementation of the Proposed Action.

The UDWR has not yet identified priority habitat with a consistent methodology. Although most of the habitat within the MBPA is marginal for sage-grouse breeding and nesting, it is possible that a few individual sage-grouse occasionally use portions of the MBPA. Approximately 2,934 acres of sagebrush shrubland, which may provide marginal habitat for sage-grouse, would be disturbed from activities related to the Proposed Action. Project-related noise (e.g., increased volumes or types of noise from construction, drilling, and production equipment, changes in ambient tones or tonal noises, and repetitive low frequency noise emanating from production equipment such as compressor stations) may affect sage-grouse that occasionally occupy the MBPA. Sage-grouse could be temporarily displaced by noise and other human activities until activities are completed.

Based on the information above, implementation of the Proposed Action may impact individual sage-grouse but ***is not likely to result in a trend towards federal listing of the species.***

Bald Eagle

As discussed in **Section 3.10.2.1.7**, no bald eagle nests have been documented in the MBPA. Therefore, direct and indirect impacts to bald eagle nests or nesting activity are not anticipated as a result of the Proposed Action. However, potential impacts from the Proposed Action that may affect wintering bald eagles that roost in along the Green River corridor and forage within the MBPA include:

- Direct habitat loss in foraging areas and/or habitat degradation to roosting areas due to construction activities
- Temporary habitat loss due to changes in vegetation structure
- Temporary displacement caused by increased human activity, traffic, and noise levels/types
- Increased potential for collisions with vehicles when foraging on carrion

Implementation of the Proposed Action would result in the direct, initial short-term loss of approximately 10,895 acres of suitable habitat for prey species during the construction of roads, pipelines, well pads, and ancillary facilities. Loss of prey habitat could decrease prey abundance, which has been shown to cause eagles to shift their geographic foraging patterns. These shifts in foraging patterns may force eagles to travel farther and to expend additional energy, which causes greater physical stress (Brown 1993). Additionally, any degradation of stream habitat and associated fisheries would lower the availability of aquatic prey for foraging eagles. Other effects on bald eagles could include direct habitat loss and temporary habitat loss associated with surface disturbance and changes/losses in vegetation structure from project development.

Wintering bald eagles congregate at established sites for purposes of feeding and sheltering in close proximity to sufficient food sources. Approximately 60 acres of surface disturbance is proposed within 0.5 mile of identified bald eagle roosting locations. Human activities near or within communal roost sites may prevent eagles from feeding or taking shelter, especially if other undisturbed suitable sites are not available. Disruptive activities in the flight path between important roosting and foraging areas may interfere with feeding, and activities that permanently alter these habitats may eliminate essential elements for feeding and sheltering eagles within an area (USFWS 2007d). Some studies have shown that sensitivity of bald eagles to human activity may lead to nest or roost abandonment during periods of drilling or construction (Steidl and Anthony 1996; Steidl and Anthony 2000). However, other studies have shown evidence of bald eagle habituation to human-induced disturbances (Parson 1994; Steidl and Anthony 1996).

With implementation of the Proposed Action, drilling and construction activities would continue through the winter months, thus increasing human presence, traffic, and associated noise levels (e.g., increased volumes from construction, drilling, and production equipment, changes in ambient tones or tonal noises, and repetitive low frequency noise emanating from production equipment such as compressor stations). Wintering eagles are likely to search for prey in the MBPA from early November through late March. Because bald eagles feed on roadside carrion (particularly during these months), the risk of being struck by a vehicle would increase under the Proposed Action, due to a commensurate increase in traffic levels associated with an estimated 606 miles of roads under this alternative. Measures to control speed limits and adherence to the removal of big game carcasses from roadsides would be implemented to reduce the potential for vehicle-related collisions with bald eagles. Additionally, development activities could result in short-term displacement and increased stress levels in roosting and foraging bald eagles during the winter months, when roosting typically occurs. The proposed water collector well would be drilled during low flow, in the fall or winter. Construction activity within the floodplain during the winter months could lead to temporary displacement from roosting and foraging habitat. However, these potential impacts would likely be minimal, because little development has been proposed near bald eagle roosting and foraging habitats identified along Pariette Draw and the Green River corridor.

Overall, the Proposed Action may directly and indirectly impact individual bald eagles but ***is not likely to result in a trend towards federal listing of the species***.

Golden Eagle

Impacts to golden eagles from implementation of the Proposed Action would be similar to those identified and assessed in **Section 4.9.1.1.6** for raptors, including displacement caused by increased human activity, nest desertions and/or reproductive failure caused by project-related disturbances, increased public access and subsequent human disturbance resulting from new road construction, and temporary reductions in prey populations due to habitat fragmentation and alteration.

The Proposed Action would result in direct adverse long-term impacts to breeding, nesting, and wintering golden eagles. The level of these impacts would depend on the location of the proposed development activities relative to occupied territories, active or inactive nest sites, wintering areas, and foraging areas. Vegetation removal associated with the Proposed Action would result in the loss of approximately 10,895 acres of habitat for prey species (e.g., ground squirrels, prairie dogs, and rabbits). The loss of some prey species may limit foraging opportunities for individual eagles. Impacts to small mammal populations from habitat loss and fragmentation can result in a reduced prey base for raptors, resulting in lower raptor densities. In addition, golden eagles may avoid hunting grounds where construction or drilling activities are taking place. Like the bald eagle, roadside carrion is one of the golden eagle's primary winter food sources, the potential for vehicle collisions with carrion-feeding golden eagles could increase in the MBPA as a result of increased traffic levels.

Approximately 2,402 acres of surface disturbance is proposed within 0.5 mile of identified golden eagle nests. Project development and construction in proximity to an active nest during the breeding season may result in nest abandonment (a direct adverse effect) and mortality of young (an indirect, adverse effect). Such disturbance could result in temporary displacement of eagles or avoidance of nesting sites caused by increased human activity and traffic levels. Since golden eagles often alternate between nest sites within a breeding territory, any surface facilities where ongoing traffic or human presence occurs could prevent inactive nests from being used in the future. It is likely that previous development and ongoing operations could result in a reduction in habitat suitability and may preclude future use by this species within the MBPA.

As outlined in **Section 3.10.2.1.8**, golden eagles are a widespread raptor species in the MBPA, with some 72 known golden eagle nests, 17 of which were active between 2006 and 2008. BLM-required seasonal and spatial restrictions and the ACEPM detailed in **Section 2.2.12.7** would minimize direct impacts to suitable habitat and eliminate direct impacts to individual birds during the nesting season. Under these measures, no construction or surface-disturbing activities would occur within 0.5 mile of an active nest during the breeding season. With implementation of this ACEPM and other conservation measures, including interim and final reclamation, adherence to speed limits, and measures to contact the County for carrion removal, the Proposed Action may affect individual golden eagles but ***is not likely to result in a trend towards federal listing of the species.***

Ferruginous Hawk

Implementation of the Proposed Action could result in both direct and indirect impacts to the ferruginous hawk. Impacts to ferruginous hawks would be very similar to those identified and assessed in **Section 4.9.1.1.6** for raptors, including temporary displacement caused by increased human activity, nest desertions and/or reproductive failure caused by project-related disturbances, increased public access and subsequent human disturbance resulting from new road construction, and temporary reductions in prey populations due to habitat fragmentation and alteration.

Ferruginous hawks are particularly susceptible to human-caused disturbances during courtship and incubation periods, and the species could abandon nests if disturbed prior to the eggs hatching (Wheeler 2003). Approximately 2,075 acres of surface disturbance is proposed within 0.5 mile of identified ferruginous hawk nests within the MBPA. Construction, drilling, or completion activities, plus increased traffic, could potentially disrupt breeding and nesting activities in the MBPA. Such disturbance could result in displacement from nesting sites and reduce nesting success. A reduction in reproductive success could continue throughout the LOP, particularly where historical nesting sites are located near heavy traffic roads or areas with intense human activity. Displacement could lead to increased use of adjacent habitats, which could consequently lead to increased inter- and intra-specific competition for resources.

Surface disturbances associated with the Proposed Action would result in the initial direct loss and fragmentation of approximately 10,895 of acres habitat for prey species such as ground squirrels, prairie dogs, jackrabbits, rabbits, small rodents, and birds. The direct habitat loss and reduced habitat values in foraging areas, loss of prey and prey habitat, plus an increased potential for collisions with vehicles traveling in the MBPA, may limit foraging opportunities for individual ferruginous hawks.

As outlined in **Section 3.10.2.1.9**, ferruginous hawks are a widespread raptor species in the MBPA, with 72 known nests, 18 of which were active between 2006 and 2008. BLM-required seasonal and spatial restrictions and the ACEPM detailed in **Section 2.2.12.7** would minimize direct impacts to suitable habitat and eliminate direct impacts to individual birds during the nesting season. Under these measures, no construction or surface-disturbing activities would occur within 0.5 mile of an active nest during the breeding season, which occurs from March 1 through August 1. This measure also reduces the risk of direct mortality and nest abandonment during the breeding season. With the implementation of this ACEPM and other conservation measures, including interim and final reclamation, as well as adherence to speed limits, the Proposed Action may affect individual ferruginous hawks but ***is not likely to result in a trend towards federal listing of the species.***

Short-eared Owl

Implementation of the Proposed Action could result in direct and indirect impacts to the short-eared owl. Direct impacts to short-eared owls could primarily include loss and fragmentation of nesting and foraging habitats. Indirect impacts could include displacement from foraging areas and reduction of prey species' habitat.

Only one short-eared owl nest has been documented within the MBPA, because limited nesting habitat is present within the area. Approximately 15 acres of surface disturbance is proposed within 0.25 mile of this nesting site. Implementation of the Proposed Action would likely have minimal impacts on short-eared owls. Temporary displacement or avoidance of habitats could affect short-eared owls potentially nesting on the ground in the vicinity of construction activities. As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for short-eared owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If short-eared owls are documented within a 0.25 mile of any proposed project activities, surface-disturbing activities would not commence until after August 31. Short-eared owl nests are often located on the ground and are difficult to see in areas of dense vegetation. Active nests could potentially be missed during aerial or ground surveys which could result in impacts on breeding, nesting, and fledgling success and may also be subject to mortality from collisions with construction vehicles or equipment. It is likely that previous development and ongoing operations have resulted in a reduction in habitat suitability and may preclude future use within the MBPA by this species. Implementation of the Proposed Action may affect individual short-eared owls but ***is not likely to result in a trend towards federal listing of the species.***

Burrowing Owl

The UDWR has identified and mapped approximately 11,647 acres of white-tailed prairie dog colonies within the MBPA, which serves as suitable habitat for the burrowing owl. Approximately 1,331 acres of this habitat would be disturbed under the Proposed Action. Implementation of the Proposed Action would have both direct and indirect adverse impacts on burrowing owls in the MBPA. The adverse impacts would include a direct loss of nesting and foraging habitat, loss of prey and prey habitat, an increased risk of vehicle-related mortality, increased displacement due to increased noise and human presence, and increased habitat fragmentation and habitat modification. Approximately 166 acres of surface disturbance would occur within 0.25 mile of known burrowing owl nests within the MBPA. Surface-disturbing activities or areas with concentrated human activity in proximity of an active burrowing owl nest could lead to nest abandonment, thereby affecting the breeding pair and their annual productivity. Since burrowing owls alternate between nest sites within a breeding territory, any surface facilities where ongoing traffic or human presence occurs in or near active prairie dog colonies could prevent burrows from being used as nest sites in the future. Avoidance of disturbed areas could lead to an increased use of adjacent habitat, which could then lead to increase inter- and intra-specific competition for resources with these adjacent habitats.

With implementation of the Proposed Action, the greatest indirect impacts would likely be related to reduced forage and nesting habitat. In order to protect burrowing owls during exploration, drilling, and other development activities, ACEPMs would be implemented to reduce or minimize displacement or nest abandonment, including spatial/temporal buffers around active nests and adherence to speed limits. As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for burrowing owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If burrowing owls are documented within a 0.25 mile of any proposed project activities, surface-disturbing activities would not commence until after August 31. Thus, direct impacts on active burrowing owl nests would be avoided. Indirect, negative impacts could include displacement from foraging areas and reduction of prey species. Based on these potential indirect effects, the Proposed Action may affect individual burrowing owls but ***is not likely to result in a trend towards federal listing of the species.***

Lewis's Woodpecker

This species may be present along portions of Pariette Wash that are found within the MBPA. Approximately 658 acres (or 0.5 percent) of woodland habitat within the MBPA could be directly affected by the Proposed Action. Impacts to the Lewis woodpecker include the direct loss of any large mature trees in riparian areas that could serve as suitable reproduction and foraging areas, timing of surface-disturbing actions, and increased human presence during sensitive breeding and nesting periods. These impacts could cause individual breeding pairs to abandon the area and/or abandon the nest and young by choosing other areas.

Indirect impacts extend these direct impacts to include increased inter- and intra-species competition for suitable breeding and foraging sites elsewhere along the riparian corridors. Of the 16,129 acres of surface disturbance, approximately 8,321 acres would be reclaimed, and the remaining 7,808 acres would be lost for the LOP. It is reasonable to expect that considerably more time following interim and final reclamation would be needed, possibly as long as 20 years, for any downed mature riparian trees species (primarily cottonwood) to be replaced and achieve a vertical height and canopy cover preferred by the Lewis's woodpecker. Displacement to other, possibly less suitable habitat areas could result in lowered overall physical conditioning of the birds, affecting breeding success and survivability of young. It is likely that Lewis's woodpeckers would avoid the disturbed riparian areas until the required canopy composition and structure are returned. Because suitable reproduction and foraging habitat for the Lewis's woodpecker occurs along the Pariette Wash, along the Green River, and at the nearby Ouray Wildlife Refuge, the Proposed Action ***is not likely to result in a trend towards federal listing of the species.***

American White Pelican

Under the Proposed Action, no direct loss of breeding or foraging habitat is anticipated as a result of construction and operation activities. No wetlands and riverine habitats that would host shallow fish populations would be disturbed by the Proposed Action. Additionally, no island habitats near freshwater lakes are present within the MBPA.

American white pelicans using the Green River adjacent to the MBPA may be indirectly impacted from the development activities within the MBPA. Increased noise and light on well construction sites could potentially lead to the abandonment of adjacent foraging areas in the Green River. The increase in erosion and subsequent sedimentation as a result of Proposed Action could lower the quality of habitat for prey species within the Green River, which would reduce the amount of available prey in foraging habitat within the Green River. Because breeding habitat is not present in the MBPA and due to the low quantity of foraging habitat within and adjacent to the MBPA, the Proposed Action ***is not likely to result in a trend towards federal listing of the species.***

Long-billed Curlew

The conversion of grassland habitat to oil and gas facilities represents a direct loss of breeding habitat for the long-billed curlew. Under the Proposed Action, approximately 1,090 acres (0.9 percent) of grassland habitat that could be utilized for nesting and foraging would be disturbed by construction activity. Should well construction, drilling, and completion occur during spring and summer months, breeding birds migrating and nesting in grassland habitat within the MBPA may be subject to indirect effects such as noise and visual disturbances, or direct effects such as loss of breeding habitat from construction activities.

Indirect disturbance such as environmental stress upon breeding pairs of long-billed curlew may lead to nest abandonment, lowered reproductive success, and reduced physical conditioning. The movement of individuals into adjacent habitats could increase intra- and inter- specific competition due to increases in animal density within these habitats. Displacement to other, possibly less suitable habitat areas could result in lowered overall physical conditioning of the birds, affecting breeding success and survivability of young. Because the Proposed Action would not impact the Ouray National Wildlife Refuge, which is the only area near the MBPA that nesting long-billed curlews have been observed, and because grasslands that may serve as suitable habitat for long-billed curlew are found throughout the Uinta Basin, the Proposed Action ***is not likely to result in a trend towards federal listing of the species.***

Mountain Plover

As outlined in **Section 3.10.2.1.15**, approximately 75,701 acres of historic mountain plover habitat and 455 acres of concentration areas are located within the MBPA. Direct impacts to mountain plover would result from the direct loss of grassland-low shrub habitat suitable for reproduction and foraging, as well as the timing of surface-disturbing actions and increased human presence during sensitive breeding and nesting periods. These impacts could cause individual breeding pairs to abandon the area and/or abandon the nest and young by choosing other areas.

Indirect impacts extend the direct impacts to include increased inter- and intra-species competition for suitable breeding and foraging sites elsewhere within the salt desert shrub and sagebrush areas both in the MBPA and surrounding areas. The Proposed Action would result in disturbance to approximately 10,446 acres (or about 14 percent of potential habitat within the MBPA) of potential mountain plover habitat. Approximately 71 acres (about 1.6 percent of concentration areas within the MBPA) of concentration areas for mountain plover would be impacted under the Proposed Action. Suitable reproduction and foraging habitat for the mountain plover mainly occur within these concentration areas. As such, implementation of the Proposed Action may impact individual mountain plovers but ***is not likely to result in a trend towards federal listing of the species.***

Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker

River depletions, sedimentation, crude oil and natural gas condensate spill effects, and modification of larval fish habitat are effects in common to the special concern Colorado River system fish species (i.e., roundtail chub, bluehead sucker, and flannelmouth sucker). These three species could be negatively affected by the Proposed Action's impacts to the Green River, and impacts to these species would be the same as the impacts to federally listed Colorado River fish, as described above. Implementation of the Proposed Action may impact individual Colorado River sensitive fish species but ***is not likely to result in a trend towards federal listing of the species.***

Barneby's Catseye

Implementation of the Proposed Action could result in the direct disturbance of potential habitat for Barneby's catseye, if present within the MBPA. Under the Proposed Action, approximately 1,292 acres of pinyon-juniper woodland and sagebrush vegetation, which serve as potential habitat for Barneby's catseye, would be impacted. Following construction, approximately 760 acres of initial disturbance (59 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of pinyon-juniper woodland and sagebrush communities under the Proposed Action would be reduced to approximately 532 acres.

As with the Uinta Basin hookless cactus, implementation of the Proposed Action could also increase the potential for indirect and dispersed direct effects to this species, if present. Disturbances from construction could increase the potential for the limited invasion and establishment of noxious weed species. In addition, these disturbances could potentially increase wind erosion of disturbed areas, which creates airborne dust that could be transported into suitable habitat for this species, as described previously for the Uinta Basin hookless cactus. Implementation of the Proposed Action may impact individual Barneby's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

Graham's Catseye

Implementation of the Proposed Action could result in the direct disturbance of potential habitat for Graham's catseye, if present within the MBPA. Under the Proposed Action, approximately 7,399 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serve as potential habitat for Graham's catseye, would be impacted. Following construction, approximately 4,244 acres of initial disturbance (57 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, desert scrub, and pinyon-juniper woodland vegetation under the Proposed Action would be reduced to approximately 3,155 acres.

As with the Uinta Basin hookless cactus and Barneby's catseye, implementation of the Proposed Action could also increase the potential for indirect and dispersed direct effects to this species, if present. Disturbances from construction could increase the potential for the limited invasion and establishment of noxious weed species. Moreover, these disturbances could potentially increase wind erosion of disturbed areas, creating airborne dust that could be transported into suitable habitat for this species, as described previously for the Uinta Basin hookless cactus. Implementation of the Proposed Action may impact individual Graham's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

Green River Greenthread

Since Green River greenthread is generally confined to white shale slopes and ridges at elevations greater than 5,900 feet in elevation, its potential distribution within the MBPA is extremely limited, and direct disturbance to potential habitat for this species is unlikely. However, implementation of the Proposed Action could increase the potential for occurrence of indirect and dispersed direct effects to this species, if present. Disturbances from construction could increase the potential for the limited invasion and establishment of noxious weed species. These disturbances could potentially increase wind erosion of disturbed areas, creating airborne dust that could be transported into suitable habitat for this species, as described previously for the Uinta Basin hookless cactus. Implementation of the Proposed Action may impact individual Green River greenthreads but ***is not likely to result in a trend towards federal listing of the species.***

Sterile Yucca

Implementation of the Proposed Action could result in the direct disturbance of potential habitat for sterile yucca, if present within the MBPA. Under the Proposed Action, approximately 1,518 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serve as potential habitat for sterile yucca, would be impacted. Following construction, approximately 866 acres of initial disturbance (57 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation under the Proposed Action would be reduced to approximately 652 acres.

As with the Uinta Basin hookless cactus, Barneby's catseye, and Graham's catseye, implementation of the Proposed Action could also increase the potential for indirect and dispersed direct effects to this species, if present. Disturbances from construction could increase the potential for the limited invasion and establishment of noxious weed species. Furthermore, these disturbances could potentially increase wind erosion of disturbed areas, which creates airborne dust that could be transported into suitable habitat for this species, as described previously for the Uinta Basin hookless cactus. Implementation of the Proposed Action may impact individual sterile yuccas but ***is not likely to result in a trend towards federal listing of the species.***

4.10.1.2 Alternative B – No Action Alternative

4.10.1.2.1 Species Listed as Federally Threatened, Endangered, or Proposed

Western Yellow-billed Cuckoo

Direct and indirect impacts to the WYBC under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Under the No Action Alternative, Newfield would continue to construct roads, well pads, and ancillary facilities to complete up to 788 wells, including those proposed on state and private lands as well as those previously approved under the August 2005 ROD for the Castle Peak and Eightmile Flat Oil and Gas Expansion EIS.

The overall surface disturbance to Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation that serves as potential nesting and foraging habitat for cuckoo would be approximately 1 acre, which is nearly 95 percent less than the Proposed Action. No surface disturbance would occur within proposed critical habitat for the WYBC.

Because implementation of Alternative B would directly impact only 1 acre of suitable WYBC habitat, it would constitute a negligible percentage of suitable habitats available throughout the range of this species. In addition, the mitigation measures in **Section 4.12.2.5** would require WYBC surveys before any surface disturbance or drilling occurs in WYBC habitat during the breeding and nesting season. Thus, implementation of the No Action Alternative ***is not likely to adversely affect*** the threatened WYBC.

Colorado River Fish Species

Direct and indirect impacts to Colorado River endangered fish species (i.e., bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) and their habitats under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. The severity of these impacts to Colorado River endangered fish species would depend on a number of factor including the type and duration of disturbance, time of year, and implementation of recommended and required mitigation measures.

As outlined in **Section 4.6.1.2.1.1**, it is estimated that total water use in drilling and completion of 788 wells under the No Action Alternative would be approximately 322 acre-feet of water annually. Additionally, it is estimated that Newfield would use approximately 10 acre-feet of water per year for dust abatement during project operations and up to 548 acre-feet per year for water-flooding operations. Thus, total water use under the No Action Alternative would average approximately 884 acre-feet annually over the 20- to 30-year construction and operational period, which is approximately 3,082 acre-feet per year less than what would be used under the Proposed Action.

As with the Proposed Action, implementation of Alternative B could also degrade USFWS-designated critical habitat for Colorado River fish in the Green River by increasing erosion and sediment yield. Conservatively, assuming that all sediment delivered to Pariette Draw and other drainages within the MBPA is eventually transported to the Green River, Alternative B would increase sediment loading to the Green River by about 52 tons annually, or by approximately 0.001 percent in the short-term. This represents approximately a 10-ton decrease from the amount under the Proposed Action.

Under Alternative B, pipelines would cross ephemeral streams at approximately 807 locations within the MBPA. For the same reasons as described under the Proposed Action, the potential for a release of contaminants into the main stem of the Green River, and subsequent increased risk of acute or chronic toxicity to endangered fish in the Green River in the event of a natural-gas condensate spill, is considered to be low. The proposed mitigation measures described in **Section 4.10.2.3** would preclude the development of wells in the floodplain.

Based on the projected water depletions and the increase in yields of the Green River, implementation of Alternative B ***may affect, is likely to adversely affect*** the listed Colorado River fish species, bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker and their habitat. The loss or “take” of an unknown number of individual fish would be anticipated. The potential also exists that portions of the designated critical habitat for these species may be adversely modified.

Uinta Basin Hookless Cactus and Pariette Cactus

Implementation of the No Action Alternative would directly result in the disturbance of approximately 349 acres of potential habitat for *Sclerocactus* species within the MBPA, which represents approximately 0.1 percent of the total potential habitat for *Sclerocactus* species across their entire range. Following construction, approximately 73 acres (22 percent) of land associated with the construction of the well pads, access roads, and pipeline ROWs not needed for operation purposes would be reclaimed. If reclamation is successful, the long-term disturbance to *Sclerocactus* species’ habitat under the No Action Alternative would be reduced to approximately 272 acres.

Implementation of Alternative B would initially result in direct short-term loss of approximately 6 acres of Level 1 core habitat and 69 acres of Level 2 core habitat within the MBPA. Following construction, a portion of the disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance to Level 1 and 2 Core Conservation Areas under the No Action Alternative would be reduced to approximately 4 acres and 55 acres, respectively.

Indirect and dispersed direct effects to *Sclerocactus* species (including an increased potential for the invasion and establishment of noxious weed species, impacts from herbicides used to control invasive plants in the MBPA, and possible reductions in pollination or seed dispersal from a larger road network that could result in isolated populations due to habitat fragmentation and increased dust) would be similar to that previously discussed under the Proposed Action. However, the magnitude of indirect impacts would be considerably less, because 7,493 fewer acres of potential habitat for *Sclerocactus* species would be impacted under the No Action Alternative, as compared to those under the Proposed Action.

The species-specific conservation measures for *Sclerocactus* species (**Section 4.10.2**) would include provisions to avoid occupied habitat, employ the use of spatial buffers between surface activities and known populations of plants, and monitor the effectiveness of these measures. The proposed mitigation measures for *Sclerocactus* species are described in **Section 4.10.2.5**.

Although these measures would minimize the impacts of the action to *Sclerocactus* species, larger landscape-level changes, such as increased habitat fragmentation and habitat loss, pollinator disturbance, changes in erosion and water runoff, and increased weed invasion, cannot be entirely negated. These disturbances would continue to negatively impact *Sclerocactus* species throughout the MBPA. An undetermined number of individual plants would be lost. Therefore, implementation of the No Action Alternative ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus and Pariette cactus and their habitats.

Ute Ladies'-tresses

There are no documented occurrences of Ute ladies'-tresses in the MBPA. Habitat for the Ute ladies'-tresses in the MBPA is generally confined to portions of the Pariette Wetlands. Direct disturbance to potential habitat for this species is unlikely, because no disturbance to wetlands or riparian areas in the Pariette ACEC is expected to occur under implementation of the No Action Alternative. For the same reasons, the potential for occurrence of indirect and dispersed direct effects to this species from the No Action Alternative would be unlikely to occur.

The species-specific conservation measures for Ute ladies'-tresses include provisions to avoid occupied habitat, to employ the use of spatial buffers between surface activities and known populations of plants, and to monitor the effectiveness of these measures. The proposed mitigation measures for Ute ladies'-tresses are described in **Section 4.10.2.5**.

No loss of individual plants is anticipated through implementation of the No Action Alternative, and the No Action Alternative is not anticipated to disturb suitable habitat for this species. Therefore, the No Action Alternative ***is not likely to adversely affect*** the Ute ladies'-tresses.

4.10.1.2.2 BLM Sensitive Species and Utah State Species of Concern

Fringed Myotis, Spotted Bat, Big Free-tailed Bat, and Townsend's Big-eared Bat

Direct and indirect impacts to the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Under the No Action Alternative, approximately 18 acres (2 percent) of surface disturbance would occur in Colorado Plateau Mixed Bedrock Canyon and Tableland habitats, which serve as potential roosting habitat for the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat. While cliff and crevice habitats are typically not disturbed by construction, development in the vicinity of these habitats is likely, and disturbance to bats that use these areas as day roost is possible.

Approximately 433 acres of shrub/scrub and riparian woodland habitats potentially used for foraging by these species would be disturbed under the No Action Alternative. Given that these species are uncommon in northeastern Utah (Oliver 2000) and that there is a relative abundance of foraging habitat in the adjacent habitats within the MBPA, the loss of foraging habitat is not anticipated to be a significant impact to these species. By adhering to the stated ACEPMs and successful reclamation, both interim and final, the No Action Alternative is ***not likely to result in a trend towards federal listing of the species***.

White-tailed Prairie Dog

Direct and indirect impacts to the white-tailed prairie dog under Alternative B would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Implementation of the No Action Alternative would result in the direct disturbance to approximately 40 acres (or approximately 0.3 percent) of mapped white-tailed prairie dog colonies within the MBPA. As discussed in **Section 3.10.2.1.4**, approximately 11,647 acres of prairie dog colonies are mapped within the MBPA.

Successful interim and final reclamation efforts could re-establish some of the white-tailed prairie dog habitat over time. In addition, management protections for white-tailed prairie dog colonies contained in the approved Vernal RMP (BLM 2008b) include provisions to minimize impacts to white-tailed prairie dog colonies within the Myton Complex during construction, which could further reduce impacts related to habitat loss and fragmentation in the MBPA. Overall, Alternative B may directly and indirectly impact individual white-tailed prairie dogs but ***is not likely to result in a trend towards federal listing of the species***.

Greater Sage-grouse

Direct and indirect impacts to the greater sage-grouse under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Approximately 190 acres of sagebrush shrubland, which may provide suitable habitat for sage-grouse in the MBPA, would be disturbed under the No Action Alternative. While it is likely that some sage-grouse use portions of the MBPA on a limited basis, there is no PPH for sage-grouse within the MBPA. The nearest PPH is located approximately 0.6 mile south of the MBPA**.** Additionally, there are no habitats designated as occupied, brood rearing, or winter habitats for sage-grouse within the MBPA. Based on the information above, implementation of Alternative B may impact individual sage-grouse but ***is not likely to result in a trend towards federal listing of the species.***

Bald Eagle

As discussed in **Section 3.10.2.1.6**, no bald eagle nests have been documented in the MBPA. Therefore, direct and indirect impacts to bald eagle nests or nesting activity are not anticipated as a result of Alternative B. However, implementation of the No Action Alternative may affect wintering bald eagles that roost along the Green River corridor and forage within the MBPA. These effects would be similar in scope and nature to those described under the Proposed Action, but of far less magnitude.

Implementation of the No Action Alternative would result in the direct, initial short-term loss of approximately 626 acres of suitable habitat for prey species during the construction of roads, pipelines, well pads, and ancillary facilities, which is 94 percent less than that under the Proposed Action.

Under the No Action Alternative, 1 acre of surface disturbance is proposed within 0.5 mile of identified bald eagle roosting locations. Additionally, the risk of being struck by a vehicle would decrease under the Proposed Action, due to a commensurate decrease in traffic levels associated with an estimated 68 miles of roads under this alternative. Measures to control speed limits and adherence to the removal of big game carcasses from roadsides would be implemented to reduce the potential for vehicle-related collisions with bald eagles.

Overall, Alternative B may directly and indirectly impact individual bald eagles, but ***is not likely to result in a trend towards federal listing of the species***.

Golden Eagle and Ferruginous Hawk

Direct and indirect impacts to the golden eagle and ferruginous hawk under Alternative B would be similar in scope and nature to those identified and assessed in **Section 4.9.1.1.6** for raptors and described under the Proposed Action, but of less magnitude. Vegetation removal associated with Alternative B would result in the loss of approximately 626 acres of habitat for prey species (e.g., ground squirrels, prairie dogs, and rabbits). Additionally, approximately 95 acres of surface disturbance is proposed within 0.5 mile of identified golden eagle nests, and 119 acres of disturbance is proposed within 0.5 mile of identified ferruginous hawk nests, which represents a 96 and 94 percent decrease, respectively, over that identified under the Proposed Action.

Implementation of ACEPMs and other conservation measures, including interim and final reclamation, as well as adherence to speed limits, would reduce potential impacts to golden eagles and ferruginous hawks under the No Action Alternative. Based on adherence to these measures, the No Action Alternative may affect individual golden eagles and ferruginous hawks ***but is not likely to result in a trend towards federal listing of the species.***

Short-eared Owl

Implementation of the Proposed Action could result in direct and indirect impacts to the short-eared owl. Direct impacts to short-eared owls could primarily include loss and fragmentation of nesting and foraging habitats. Indirect impacts could include displacement from foraging areas and reduction of prey species' habitat.

Only a single short-eared owl nest has been documented within the MBPA, because limited nesting habitat is present within the area. Less than 1 acre of surface disturbance is proposed within 0.25 mile of this nesting site, which is approximately 14 acres less than that of the Proposed Action. As described in **Section**

4.10.2.1, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for short-eared owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If short-eared owls are documented within a 0.25 mile of any proposed project activities, surface-disturbing activities would not commence until after August 31. Implementation of Alternative B would likely have minimal impacts on short-eared owls. Thus, implementation of the No Action Alternative may affect individual short-eared owls but ***is not likely to result in a trend towards federal listing of the species.***

Burrowing Owl

Direct and indirect impacts to the burrowing owl under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. The UDWR has identified and mapped approximately 11,647 acres of white-tailed prairie dog colonies within the MBPA, which serves as suitable habitat for the burrowing owl. Approximately 40 acres of this habitat would be disturbed under Alternative B. Less than 1 acre of surface disturbance would occur within 0.25 mile of known burrowing owl nests within the MBPA, which is approximately 165 acres less than that under the proposed Action.

As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for burrowing owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If burrowing owls are documented within a 0.25 mile of any proposed project activities, surface-disturbing activities would not commence until after August 31. Thus, direct impacts on active burrowing owl nests would be avoided. Based on scope and magnitude of potential impacts to the burrowing owl, the No Action Alternative may affect individual burrowing owls but ***is not likely to result in a trend towards federal listing of the species.***

Lewis's Woodpecker

Direct and indirect impacts to Lewis's woodpecker under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Approximately one acre of riparian woodland habitat within the MBPA could be directly affected by the No Action Alternative. Implementation of the No Action Alternative would likely have minimal impacts on Lewis's woodpecker. Thus, implementation of the No Action Alternative may affect individual Lewis's woodpeckers but ***is not likely to result in a trend towards federal listing of the species.***

American White Pelican

Similar to the Proposed Action, the No Action Alternative would not result in the direct loss of foraging or nesting habitat to the American white pelican, as no freshwater lakes, rivers, or marshlands exist within the MBPA. Indirect impacts to the American white pelican resulting from the No Action alternative would be similar in scope and nature to those outlined in the Proposed Action, but would be less in magnitude. Increase in erosion and subsequent sedimentation of MBPA soils into the Green River may reduce the overall habitat quality for prey species of the American white pelican. Additionally, an increase in development activity within the MBPA as a result of the No Action Alternative could result in increased noise and light impacts in adjacent foraging habitats along the Green River, although these impacts would be to a lesser extent than those described under the Proposed Action. While implementation of Alternative B may have minimal impacts on individual American white pelicans, it ***is not likely to result in a trend towards federal listing of the species.***

Long-billed Curlew

Direct and indirect impacts to the long-billed curlew under Alternative B would be similar in scope and nature to those identified under the Proposed Action, but less in magnitude. Approximately 49 (<0.1 percent) acres of grassland habitat within the MBPA would be directly affected by the No Action Alternative. As there would be less development within the MBPA, there are likely to be less indirect impacts from well development, human presence and habitat fragmentation under the No Action Alternative. While implementation of the No Action Alternative may have minimal impacts on individual long-billed curlews, it ***is not likely to result in a trend towards federal listing of the species.***

Mountain Plover

Direct and indirect impacts to the mountain plover under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. The No Action Alternative would result in disturbance to approximately 386 acres of potential mountain plover habitat (or about 0.5 percent of potential habitat within the MBPA). Three acres of mountain plover concentration areas would be impacted under Alternative B. As such, implementation of Alternative B may impact individual mountain plovers but ***is not likely to result in a trend towards federal listing of the species.***

Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker

Direct and indirect impacts to the roundtail chub, bluehead sucker, and flannelmouth sucker under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of far magnitude. Implementation of the No Action Alternative may impact individual Colorado River sensitive fish species but ***is not likely to result in a trend towards federal listing of the species.***

Barneby's Catseye

Direct and indirect impacts to Barneby's catseye under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Under the No Action Alternative, approximately 80 acres of pinyon-juniper woodland and sagebrush communities, which serve as potential habitat for Barneby's catseye, would be impacted. Following construction, approximately 21 acres of initial disturbance (26 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of pinyon-juniper woodland and sagebrush communities under the No Action Alternative would be reduced to approximately 59 acres. As with the Proposed Action, implementation of the No Action Alternative may impact individual Barneby's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

Graham's Catseye

Direct and indirect impacts to Graham's catseye under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Under the No Action Alternative, approximately 721 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serve as potential habitat for Graham's catseye, would be impacted. Following construction, approximately 167 acres of initial disturbance (23 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, desert scrub, and pinyon-juniper woodland vegetation under the No Action Alternative would be reduced to approximately 554 acres. As with the Proposed Action, implementation of the No Action Alternative on may impact individual Graham's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

Green River Greenthread

Since Green River greenthread is generally confined to white shale slopes and ridges at elevations greater than 5,900 feet in elevation, its potential distribution within the MBPA is extremely limited, and direct disturbance to potential habitat for this species is unlikely. Therefore, implementation of the No Action Alternative may impact individual Green River greenthreads but ***is not likely to result in a trend towards federal listing of the species.***

Sterile Yucca

Direct and indirect impacts to sterile yucca under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Under the No Action Alternative, approximately 100 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serves as potential habitat for sterile yucca, would be impacted. Following construction, approximately 33 acres of initial disturbance (33 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation under the No Action Alternative would be reduced to approximately 67 acres. As with the Proposed Action, implementation of the No Action Alternative may impact individual sterile yuccas but ***is not likely to result in a trend towards federal listing of the species.***

4.10.1.3 Alternative C – Field-wide Electrification

4.10.1.3.1 Species Listed as Federally Threatened, Endangered, or Proposed

Western Yellow-billed Cuckoo

Direct and indirect impacts to the WYBC under Alternative C would be nearly identical to those under the Proposed Action, except that Alternative C would have an additional 3,983 acres of total surface disturbance due to the installation of transmission lines and substations. The overall surface disturbance to Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation that serves as potential nesting and foraging habitat for the WYBC would be approximately 27 acres, which is 7 acres more than the Proposed Action. No surface disturbance would occur within proposed critical habitat for the WYBC.

Although this alternative would have the greatest potential for direct and indirect impacts to the WYBC among all alternatives considered, ACEPMs would minimize direct impacts to suitable habitat and eliminate direct impacts to individual birds. In addition, the mitigation measures in **Section 4.12.2.5** would require WYBC surveys before any surface disturbance or drilling occurs in WYBC habitat during the breeding and nesting season. Therefore, implementation of Alternative C ***is not likely to adversely affect*** the threatened WYBC.

Colorado River Fish Species

Direct and indirect impacts to Colorado River endangered fish species (i.e., bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) and their habitats under Alternative C would be nearly identical to those under the Proposed Action, except that Alternative C would have an additional 3,983 acres of total surface disturbance due to the installation of transmission lines and substations. The severity of these impacts to Colorado River endangered fish species would depend on a number of factors, including the type and duration of disturbance, time of year, and implementation of recommended and required mitigation measures.

The estimated total amount of water used in drilling and completion, dust abatement, and water-flooding operations under Alternative C would be approximately 3,966 acre-feet of water annually, which is identical to the amount used under the Proposed Action. As previously mentioned under the Proposed Action, Newfield currently has secured water rights for up to 5,106 acre-feet per year. Currently, a total annual volume of 3,328 acre-feet has been authorized through USWFS consultations (refer to **Table 2.2.8.4-1**). Water supply sources used under these previous consultations, plus the historic water rights, makes a total of 3,652 acre-feet of water available for this Project. The additional 314 acre-feet of water needed under Alternative C would require additional consultation.

As with the Proposed Action, implementation of the Alternative C could also degrade USFWS-designated critical habitat for Colorado River fish in the Green River by increasing erosion and sediment yield. Conservatively, assuming that all sediment delivered to Pariette Draw and other drainages within the MBPA is eventually transported to the Green River, Alternative C would increase sediment loading to the Green River by about 62 tons annually, or by approximately 0.001 percent in the short term.

Under Alternative C, pipelines would cross ephemeral streams at approximately 953 locations within the MBPA. For the same reasons as described under the Proposed Action, the potential for a release of contaminants into the main stem of the Green River, and subsequent increased risk of acute or chronic toxicity to endangered fish in the Green River in the event of a natural-gas condensate spill, is considered to be low. The proposed mitigation measures described in **Section 4.10.2.3** would preclude the development of wells in the floodplain.

Based on the projected water depletions and the increase in yields of the Green River, implementation of Alternative C ***may affect, is likely to adversely affect*** the listed Colorado River fish species, bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker and their habitat. The loss or “take” of an unknown number of individual fish would be anticipated. The potential also exists that portions of the designated critical habitat for these species may be adversely modified.

Uinta Basin Hookless Cactus and Pariette Cactus

Implementation of Alternative C would directly result in the disturbance of approximately 9,168 acres of potential habitat for *Sclerocactus* species within the MBPA, which represents approximately 2 percent of the total potential habitat for *Sclerocactus* species across its mapped range. Following construction, approximately 4,502 acres (49 percent) of land associated with the construction of the well pads, access roads, and pipeline ROWs not needed for operation purposes would be reclaimed. If reclamation is successful, the long-term disturbance to *Sclerocactus* species’ habitat under Alternative C would be reduced to approximately 4,666 acres.

Implementation of Alternative C would initially result in direct short-term loss of approximately 1,121 acres of Level 1 core habitat and 2,166 acres of Level 2 core habitat within the MBPA. Following construction, approximately 51 and 49 percent, respectively, of the disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance to Level 1 and 2 Core Conservation Areas under Alternative C would be reduced to approximately 545 acres and 1,102 acres, respectively.

Indirect and dispersed direct effects to *Sclerocactus* species (including an increased potential for the invasion and establishment of noxious weed species, impacts from herbicides used to control invasive plants in the MBPA, and possible reductions in pollination or seed dispersal from a larger road network that could result in isolated populations due to habitat fragmentation and increased dust) would be nearly identical to that previously discussed under the Proposed Action. Expansion of access roads also could also increase the risk of illegal collecting of *Sclerocactus* species.

The species-specific conservation measures (**Section 4.10.2**) for *Sclerocactus* species would include provisions to avoid occupied habitat, employ the use of spatial buffers between surface activities and known populations of plants, and monitor the effectiveness of these measures. The proposed mitigation measures for *Sclerocactus* species are described in **Section 4.10.2.5**.

Although these measures would minimize the impacts of the action to *Sclerocactus* species, larger landscape-level changes, such as increased habitat fragmentation and habitat loss, pollinator disturbance, changes in erosion and water runoff, and increased weed invasion, cannot be entirely negated. These disturbances would continue to negatively impact *Sclerocactus* species throughout the MBPA. An undetermined number of individual plants would be lost. Therefore, implementation of Alternative C ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus and Pariette cactus and their habitats.

Ute Ladies'-tresses

There are no documented occurrences of Ute ladies'-tresses in the MBPA. Habitat for the Ute ladies'-tresses in the MBPA is generally confined to portions of the Pariette Wetlands. Under Alternative C, no disturbance is proposed within riparian areas in the Pariette Wetlands ACEC, and 118 acres of disturbance is proposed in wetland vegetative cover types in the Pariette Wetlands ACEC. While the presence of wetlands is an important habitat quality for this species, the wetland vegetative cover includes open water and greasewood flats that do not represent suitable habitat for Ute ladies'-tresses. Direct disturbance to potential habitat for this species is unlikely, because very little disturbance to wetlands or riparian floodplains are expected to occur under implementation of Alternative C, and because of the conservation measures included in **Section 4.10.2**.

Implementation of Alternative C also would increase the potential for occurrence of indirect and dispersed direct effects to Ute ladies'-tresses, if present. Disturbances from construction could increase the potential for the invasion and establishment of noxious weed species. Invasion by non-native species is particularly problematic, as they are capable of effective competition with native species for space, water, light, nutrients, and subsequent survival. Over time, the successful establishment of non-native species can choke out native vegetation and eventually dominate large areas. An increase in weedy annual grasses also increases the potential for fire by increasing the density and flammability of available fuels. Grasses are more flammable and establish in denser populations than woody and non-woody native vegetation.

Additional indirect construction-related impacts could include an increased potential for wind erosion of disturbed areas, creating airborne dust that could be transported into suitable habitat for these species. Airborne dust generated by vehicles could inhibit photosynthesis and transpiration in these species. Inhibited and reduced rates of photosynthesis could affect the rate of growth, the reproductive capacity of individual plants, and ultimately the ability of these individuals to persist in adjacent areas. Thompson et al. (1984) and Farmer (1993) have indicated that varying amounts of dust settling on vegetation can block stomata, increase leaf temperature, and reduce photosynthesis.

No loss of individual plants is anticipated through implementation of Alternative C; however, Alternative C may result in the loss of potential habitat for this species. Therefore, Alternative C ***may affect, is not likely to adversely affect*** the Ute ladies'-tresses.

4.10.1.3.2 BLM Sensitive Species and Utah State Species of Concern

Fringed Myotis, Spotted Bat, Big Free-tailed Bat and Townsend's Big-eared Bat

Direct and indirect impacts to the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat under Alternative C would be nearly identical to those under the Proposed Action, except that Alternative C would have an additional 3,983 acres of total surface disturbance due to the installation of transmission lines and substations. Under Alternative C, approximately 602 acres (12 percent) of surface disturbance would occur in Colorado Plateau Mixed Bedrock Canyon and Tableland habitats, which serve as potential roosting habitat for the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat. While cliff and crevice habitats are typically not disturbed by construction, development in the vicinity of these habitats is likely, and disturbance to bats that use these areas as day roosts is possible.

Approximately 10,342 acres of shrub/scrub and riparian woodland habitats potentially used for foraging by these species would be disturbed under Alternative C. Considering that these species are uncommon in northeastern Utah (Oliver 2000), and that there is a relative abundance of foraging habitat in the adjacent habitats within the MBPA, the loss of foraging habitat is not anticipated to be a significant impact to these species. By adhering to the stated ACEPMs and successful reclamation, both interim and final, Alternative C is ***not likely to result in a trend towards federal listing of these species***.

White-tailed Prairie Dog

Direct and indirect impacts to the white-tailed prairie dog under Alternative C would be nearly identical to those under the Proposed Action, except that Alternative C would have an additional 179 acres of total surface disturbance due to the installation of transmission lines and substations. Implementation of Alternative C would result in the direct disturbance to approximately 1,645 acres (or approximately 14 percent) of mapped white-tailed prairie dog colonies within the MBPA. As discussed in **Section 3.10.2.1.5**, approximately 11,647 acres of prairie dog colonies are mapped within the MBPA.

Successful interim and final reclamation efforts could re-establish some of the white-tailed prairie dog habitat over time. In addition, management protections contained in the approved Vernal RMP (BLM 2008b) include provisions to minimize impacts to white-tailed prairie dog colonies within the Myton Complex during construction, which could further reduce impacts related to habitat loss and fragmentation in the MBPA. Overall, Alternative C may directly and indirectly impact individual white-tailed prairie dogs, but ***is not likely to result in a trend towards federal listing of the species***.

Greater Sage-grouse

Direct and indirect impacts to the greater sage grouse under Alternative C would be nearly identical to those under the Proposed Action, except that Alternative C would have an additional 3,983 acres of total surface disturbance due to the installation of transmission lines and substations. Approximately 3,889 acres of sagebrush shrubland, which may provide suitable habitat for sage-grouse in the MBPA, would be disturbed under Alternative C. While it is likely that some sage-grouse use portions of the MBPA on a limited basis, there is no PPH for sage-grouse within the MBPA. The nearest PPH is located approximately 0.6 mile south of the MBPA**.** Additionally, there are no habitats designated as occupied, brood rearing, or winter habitats for sage-grouse within the MBPA.

Based on the information above, implementation of Alternative C may impact individual sage-grouse but ***is not likely to result in a trend towards federal listing of the species.***

Bald Eagle

As discussed in **Section 3.10.2.1.6**, no bald eagle nests have been documented in the MBPA. Therefore, direct and indirect impacts to bald eagle nests or nesting activity are not anticipated as a result of Alternative C. However, implementation of Alternative C may affect wintering bald eagles that roost along the Green River corridor and forage within the MBPA. These effects would be nearly identical in scope, nature, and magnitude to those described under the Proposed Action.

Implementation of Alternative C would result in the direct, initial short-term loss of approximately 14,352 acres of suitable habitat for prey species during the construction of roads, pipelines, well pads, and ancillary facilities, which is approximately 32 percent greater than that of the Proposed Action.

Approximately 88 acres of surface disturbance is proposed within 0.5 mile of identified bald eagle roosting locations, which is 47 percent greater than that identified under the Proposed Action. The risk of being struck by a vehicle would be virtually identical to the Proposed Action. Measures to control speed limits and adherence to the removal of big game carcasses from roadsides would be implemented to reduce the potential for vehicle-related collisions with bald eagles.

Additionally, new power lines used to serve facilities and wells under Alternative C would pose an increased risk of electrocution and collision hazard to bald eagles. Electrocution is a well-documented source of mortality for eagles and other raptor species, and the vast majority of electrocutions involve electric distribution lines rather than high voltage transmission lines (APLIC 2006). As described in **Section 4.10.2.1**, potential impacts from increased risk of electrocution would be mitigated by designing poles according to criteria presented in *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (APLIC 2006). In addition, strategies for minimizing collision risk with power lines would follow criteria presented in *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012).

Overall, Alternative C may directly and indirectly impact individual bald eagles but ***is not likely to result in a trend towards federal listing of the species***.

Golden Eagle and Ferruginous Hawk

Direct and indirect impacts to the golden eagle and ferruginous hawk under Alternative C would be similar in scope, nature, and magnitude to those identified and assessed in **Section 4.9.1.1.6** for raptors and described under the Proposed Action. Vegetation loss associated with Alternative C would result in the loss of approximately 14,352 acres of habitat for prey species (e.g., ground squirrels, prairie dogs, and rabbits). Additionally, approximately 3,043 acres of surface disturbance is proposed within 0.5 mile of identified golden eagle nests and 2,526 acres of disturbance is proposed within 0.5 mile of identified ferruginous hawk nests, which is approximately 49 and 22 percent greater than that identified under the Proposed Action, respectively.

As with the bald eagle, new power lines used to serve facilities and wells under Alternative C would pose an increased risk of electrocution and collision hazard to golden eagles and ferruginous hawks. Electrocution is a well-documented source of mortality for eagles and other raptor species and the vast majority of electrocutions involve electric distribution lines rather than high voltage transmission lines (APLIC 2006). As described in **Section 4.10.2.1**, potential impacts from increased risk of electrocution would be mitigated by designing poles according to criteria presented in *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (APLIC 2006). Furthermore, strategies for minimizing collision risk with power lines would follow criteria presented in *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012).

As with the Proposed Action, implementation of ACEPMs, as well as other conservation measures, including interim and final reclamation and adherence to speed limits, would reduce potential impacts to golden eagles and ferruginous hawks under Alternative C. Based on adherence to these measures, Alternative C may affect individual golden eagles and ferruginous hawks ***but is not likely to result in a trend towards federal listing of the species.***

Short-eared Owl

Implementation of Alternative C could result in direct and indirect impacts to the short-eared owl. Direct impacts to short-eared owls could primarily include loss and fragmentation of nesting and foraging habitats. Indirect impacts could include displacement from foraging areas and reduction of prey species' habitat.

Only one short-eared owl nest has been documented within the MBPA because limited nesting habitat is present within the area. Approximately 20 acres of surface disturbance is proposed within 0.25 mile of this nesting site. As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for short-eared owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If short-eared owls are documented within a 0.25 mile of any proposed project activities, surface-disturbing activities would not commence until after August 31. Unlike other raptor species, new power lines used to serve facilities and wells under Alternative C would not pose an increased risk of electrocution to short-eared owls. Implementation of Alternative C would likely have minimal impacts to short-eared owls. Thus, implementation of Alternative C may affect individual short-eared owls but ***is not likely to result in a trend towards federal listing of the species.***

Burrowing Owl

Direct and indirect impacts to the burrowing owl under Alternative C would be nearly identical to those described under the Proposed Action. The UDWR has identified and mapped approximately 11,647 acres of white-tailed prairie dog colonies within the MBPA, which serves as suitable habitat for the burrowing owl. Approximately 1,645 acres of this habitat would be disturbed under Alternative C. Approximately 187 acres of surface disturbance would occur within 0.25 mile of known burrowing owl nests within the MBPA.

As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for burrowing owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If burrowing owls are documented within a 0.25 mile of any proposed project activities, surface-disturbing activities would not commence until after August 31. Thus, direct impacts on active burrowing owl nests would be avoided. Based on scope and magnitude of potential impacts to the burrowing owl, Alternative C may affect individual burrowing owls but ***is not likely to result in a trend towards federal listing of the species.***

Lewis's Woodpecker

Direct and indirect impacts to Lewis's woodpecker under Alternative C would be nearly identical to those described under the Proposed Action. Approximately 27 acres of riparian woodland habitat within the MBPA could be directly affected by Alternative C. Implementation of Alternative C would likely have minimal impacts on Lewis's woodpecker. Thus, implementation of Alternative C may affect individual Lewis's woodpeckers but ***is not likely to result in a trend towards federal listing of the species.***

American White Pelican

Similar to the Proposed Action, Alternative C would not result in the direct loss of foraging or nesting habitat to the American white pelican, as no freshwater lakes, rivers, or marshlands exist within the MBPA. Indirect impacts to the American white pelican resulting from Alternative C would be nearly identical in scope and nature to those outlined in the Proposed Action. Increase in erosion and subsequent sedimentation of MBPA soils into the Green River may reduce the overall habitat quality for prey species of the American white pelican. Additionally, an increase in development activity within the MBPA as a result of Alternative C could result in increased noise and light impacts in adjacent foraging habitats along the Green River. While implementation of Alternative C may have minimal impacts on individual American white pelicans, it ***is not likely to result in a trend towards federal listing of the species.***

Long-billed Curlew

Direct and indirect impacts to the long-billed curlew under Alternative C would be nearly identical to those identified under the Proposed Action. Approximately 1,407 acres (12 percent) of grassland habitat within the MBPA would be directly affected as a result of Alternative C. As the level of development under Alternative C would be similar to the Proposed Action, indirect impacts to long-billed curlew from well development, human presence and habitat fragmentation would likely be similar to that described under the Proposed Action. While implementation of Alternative C may have impacts on individual long-billed curlews, it ***is not likely to result in a trend towards federal listing of the species.***

Mountain Plover

Direct and indirect impacts to the mountain plover under Alternative C would be nearly identical to those described under the Proposed Action. Implementation of Alternative C would result in disturbance to approximately 12,269 acres (or about 16 percent of potential habitat within the MBPA) of potential mountain plover habitat. Approximately 87 acres of concentration areas for mountain plover would be impacted under Alternative C, which is approximately 16 acres more than under the Proposed Action. As such, implementation of Alternative C may impact individual mountain plovers but ***is not likely to result in a trend towards federal listing of the species.***

4.10.1.3.2.1 Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker

Direct and indirect impacts to the roundtail chub, bluehead sucker, and flannelmouth sucker under Alternative C would be nearly identical in scope and nature to those described under the Proposed Action. Implementation of Alternative C may impact individual Colorado River sensitive fish species but ***is not likely to result in a trend towards federal listing of the species.***

Barneby's Catseye

Direct and indirect impacts to Barneby's catseye under Alternative C would be similar in scope and nature to those described under the Proposed Action. Under Alternative C, approximately 1,688 acres of pinyon-juniper woodland and sagebrush communities, which serve as potential habitat for Barneby's catseye, would be impacted. Following construction, approximately 946 acres of initial disturbance (56 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of pinyon-juniper woodland and sagebrush communities under Alternative C would be reduced to approximately 742 acres. As with the Proposed Action, implementation of Alternative C may impact individual Barneby's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

Graham's Catseye

Direct and indirect impacts to Graham's catseye under Alternative C would be similar in scope and nature to those described under the Proposed Action. Under Alternative C, approximately 9,646 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serve as potential habitat for Graham's catseye, would be impacted. Following construction, approximately 5,312 acres of initial disturbance (55 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, desert scrub, and pinyon-juniper woodland vegetation under Alternative C would be reduced to approximately 4,334 acres. As with the Proposed Action, implementation of Alternative C may impact individual Graham's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

Green River Greenthread

Since Green River greenthread is generally confined to white shale slopes and ridges at elevations greater than 5,900 feet in elevation, its potential distribution within the MBPA is extremely limited and direct disturbance to potential habitat for this species is unlikely. Therefore, implementation of Alternative C may impact individual Green River greenthreads but ***is not likely to result in a trend towards federal listing of the species.***

Sterile Yucca

Direct and indirect impacts to sterile yucca under Alternative C would be similar in scope and nature to those described under the Proposed Action. Under Alternative C, approximately 1,978 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serves as potential habitat for sterile yucca, would be impacted. Following construction, approximately 1,113 acres of initial disturbance (56 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation under Alternative C would be reduced to approximately 865 acres. As with the Proposed Action, implementation of Alternative C may impact individual sterile yuccas but ***is not likely to result in a trend towards federal listing of the species.***

4.10.1.4 Alternative D – Agency Preferred Alternative

4.10.1.4.1 Species Listed as Federally Threatened, Endangered, or Proposed

Western Yellow-billed Cuckoo

Direct and indirect impacts to WYBC under Alternative D would be similar in nature and scope to those described under the Proposed Action. However, the magnitude of potential impacts would be less under Alternative D, as fewer new well pads would be constructed, the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology, limited surface disturbance or well pad expansions would be allowed on federal lands within the Pariette Wetlands ACEC, and surface disturbance within riparian and 100-year floodplain habitats would be limited to the water collector well. This alternative, therefore, would have the lowest potential for impacts to WYBC of any action alternative considered. The overall initial surface disturbance to Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation, which serves as potential nesting and foraging habitat for cuckoo, would be approximately 1 acre, which is approximately 19 acres less than that affected by the Proposed Action. No surface disturbance would occur within proposed critical habitat for the WYBC.

Because implementation of Alternative D would directly impact only 1 acre of suitable WYBC habitat, it constitutes a negligible percentage of suitable habitats available throughout the range of this species. In addition, the mitigation measures in Section 4.12.2.5 would require WYBC surveys before any surface disturbance or drilling occurs in WYBC habitat during the breeding and nesting season. Therefore, implementation of Alternative D ***is not likely to adversely affect*** the threatened WYBC.

Colorado River Fish Species

Direct and indirect impacts to Colorado River endangered fish species (i.e., bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) and their habitats under Alternative D would be similar in scope and nature to those described under the Proposed Action, including a similar magnitude with regard to water withdrawals, but of lesser magnitude with regard to sedimentation effects. The severity of these impacts to Colorado River endangered fish species would depend on a number of factors, including the type and duration of disturbance, time of year, and implementation of recommended and required mitigation measures.

As outlined in **Section 2.6.4**, it is estimated that total water use in drilling and completion of up to 5,750 wells under Alternative D would be approximately 1,150 acre-feet of water annually. Additionally, it is estimated that Newfield would use approximately 36 acre-feet of water per year for dust abatement during project operations and up to 2,738 acre-feet per year for water-flooding operations. Thus, total water use under Alternative D would average approximately 2,774 acre-feet annually over the 20- to 30-year construction and operational period, which is approximately 39 acre-feet per year less than the amount used under the Proposed Action.

As previously mentioned under the Proposed Action, Newfield currently has secured water rights for up to 5,106 acre-feet per year. Currently, a total annual volume of 3,328 acre-feet has been authorized through USWFS consultations (refer to **Table 2.2.8.4-1**). Water supply sources used under these previous consultations, plus the historic water rights, makes a total of 3,652 acre-feet of water available for this Project. The additional 273 acre-feet of water needed under Alternative D would require additional consultation.

As with the Proposed Action, implementation of Alternative D could also adversely affect USFWS-designated critical habitat for Colorado River fish in the Green River by increasing erosion and sediment yield. Conservatively, assuming that all sediment delivered to Pariette Draw and other drainages within the MBPA is eventually transported to the Green River, Alternative D would increase sediment loading to the Green River by about 66 tons annually, or by approximately 0.001 percent in the short-term.

Under Alternative D, pipelines would cross ephemeral streams at approximately 1,046 locations within the MBPA. Surface disturbance in riparian habitats and the floodplain would be limited to the water collector well. Therefore, the potential for a release of contaminants into the main stem of the Green River, and subsequent increased risk of acute or chronic toxicity to endangered fish in the Green River in the event of a natural-gas condensate spill, is considered to be low. The proposed mitigation measures described in **Section 4.10.2.3** would preclude the development of wells in the floodplain.

Based on the projected water depletions and the increase in yields of the Green River, implementation of Alternative D ***may affect, is likely to adversely affect*** the listed Colorado River fish species, bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker and their habitat. The loss or “take” of an unknown number of individual fish would be anticipated. In addition, implementation of Alternative D ***may affect, is likely to adversely affect*** critical habitat due to the construction of a 1-acre water collector well in the floodplain of the Green River.

Uinta Basin Hookless Cactus and Pariette Cactus

As previously discussed in Chapter 2, one of the primary objectives of Alternative D is to reduce surface disturbance within Sclerocactus habitat and specifically, within the Upper and Lower Pariette Core Conservation Areas. However, for analysis purposes, the Alternative evaluated the most conservative (i.e., worst case) scenario. Under this conservative scenario, implementation of Alternative D could directly result in the disturbance of approximately 4,295 acres of potential habitat for Sclerocactus species within the MBPA, which represents approximately 1 percent of the total potential habitat for Sclerocactus species across their entire range. Following construction, approximately 2,201 acres (51 percent) of land associated with the construction of the well pads, access roads, and pipeline ROWs not needed for operation purposes would be reclaimed. If reclamation is successful, the long-term disturbance to Sclerocactus species’ habitat under Alternative D would be reduced to approximately 2,094 acres, which is approximately 1,298 acres (62 percent) less than that under the Proposed Action.

Under Alternative D, no new surface disturbance or well pad expansions would occur within Level 1 core Conservation Areas except as allowed under the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus (see Biological Assessment – Attachment to Appendix J, Biological Opinion). Per the strategy in Level 1 areas, GIS calculations show conceptually mapped initial disturbance of 116 acres from limited well pad expansions and pipelines buried adjacent to existing roads and up to 20 acres of new disturbance from eight new well pads. Following interim reclamation this would be reduced to about 57 acres. In Level 2 areas, GIS calculations show conceptually mapped disturbance of approximately 870 acres, which would be reduced to about 360 acres after interim reclamation. Surface disturbance in Level 2 areas would be minimized to the greatest extent practicable by using existing infrastructure (i.e., access roads and pipelines) and directional drilling from multiwall pads that would either require the expansion of existing well pads or the construction of a limited number of new multiwall pads. Concentrated use of existing well pads would reduce fragmentation of Sclerocactus habitat. If reclamation is successful, the long-term disturbance to Level 1 and Level 2 Core Conservation Areas under Alternative D would be reduced to approximately 57 acres and 360 acres, respectively. Similarly, Alternative D's focused use of existing well pads would reduce the level of habitat fragmentation from new roads and pipeline corridors as compared to the Proposed Action.

Indirect and dispersed direct effects to *Sclerocactus* species (including an increased potential for the invasion and establishment of noxious weed species, impacts from herbicides used to control invasive plants in the MBPA, and possible reductions in pollination or seed dispersal from a larger road network that could result in isolated populations due to habitat fragmentation and increased dust) would be similar to that previously discussed under the Proposed Action. However, the magnitude of indirect impacts would be comparatively less, because 3,467 fewer acres of potential habitat for *Sclerocactus* species would be impacted in the long term under Alternative D, as compared to those under the Proposed Action.

Additional species-specific conservation measures for *Sclerocactus* species under Alternative D, beyond those included in **Section 4.10.2**, include provisions to avoid all new surface disturbances to Level 1 Core Conservation Areas (except as allowed by the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus (see Biological Assessment – Attachment to Appendix J, Biological Opinion)), and to limit the disturbance to Level 2 Core Conservation Areas through the use of existing multi-well pads and roads and increased use of directional drilling technology (**Section 2.6.2**). The proposed mitigation measures for *Sclerocactus* species are described in **Section 4.10.2.5**.

Although these measures would minimize the impacts of the action to *Sclerocactus* species, larger landscape-level changes, such as increased habitat fragmentation and habitat loss, pollinator disturbance, changes in erosion and water runoff, and increased weed invasion, cannot be entirely negated. These disturbances could continue to negatively impact *Sclerocactus* species throughout the MBPA, although at a substantially reduced level as compared to those under the Proposed Action. An undetermined number of individual plants could be lost; therefore, implementation of Alternative D ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus and Pariette cactus and their habitats.

Ute Ladies'-tresses

There are no documented occurrences of Ute ladies'-tresses in the MBPA. Habitat for the Ute ladies'-tresses in the MBPA is generally confined to portions of the Pariette Wetlands. Direct disturbance to potential habitat for this species is unlikely, because no disturbance to wetlands or riparian areas in the Pariette ACEC is expected to occur under implementation of Alternative D. For the same reasons, the potential for occurrence of indirect and dispersed direct effects to this species from Alternative D would be unlikely to occur.

The species-specific conservation measures for Ute ladies'-tresses include provisions to avoid occupied habitat, to employ the use of spatial buffers between surface activities and known populations of plants, and to monitor the effectiveness of these measures. The proposed mitigation measures for Ute ladies'-tresses are described in **Section 4.10.2.5**.

No loss of individual plants is anticipated through implementation of Alternative D, nor is Alternative D anticipated to impact suitable habitat for this species. Therefore, Alternative D ***is not likely to adversely affect*** the Ute ladies'-tresses.

4.10.1.4.2 BLM Sensitive Species and Utah State Species of Concern

Fringed Myotis, Spotted Bat, Big Free-tailed Bat and Townsend's Big-eared Bat

Direct and indirect impacts to the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat under Alternative D would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Under Alternative D, approximately 254 acres (2.5 percent) of surface disturbance would occur in Colorado Plateau Mixed Bedrock Canyon and Tableland habitats, which serve as potential roosting habitat for the fringed myotis, big free-tailed bat spotted bat, and Townsend's big-eared bat. While cliff and crevice habitats are typically not disturbed by construction, development in the vicinity of these habitats is likely, and disturbance to bats that use these areas as day roosts is possible.

Approximately 5,856 acres of shrub/scrub and riparian woodland habitats potentially used for foraging by these species would be disturbed under Alternative D. Considering that these species are uncommon in northeastern Utah (Oliver 2000), and that there is a relative abundance of foraging habitat in the adjacent habitats within the MBPA, the loss of foraging habitat is not anticipated to be a significant impact to these species. By adhering to the stated ACEPMs and successful reclamation, both interim and final, Alternative D is ***not likely to result in a trend towards federal listing of the species***.

White-tailed Prairie Dog

Direct and indirect impacts to the white-tailed prairie dog under Alternative D would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Implementation of Alternative D would result in the direct disturbance to approximately 916 acres (or approximately 8 percent) of mapped white-tailed prairie dog colonies within the MBPA. As discussed in **Section 3.10.2.1.5**, approximately 11,647 acres of prairie dog colonies are mapped within the MBPA.

Successful interim and final reclamation efforts could re-establish some of the white-tailed prairie dog habitat over time. In addition, management protections contained in the approved Vernal RMP (BLM 2008b) include provisions to minimize impacts to white-tailed prairie dog colonies within the Myton Complex during construction, which could further reduce impacts related to habitat loss and fragmentation in the MBPA. Overall, Alternative D may directly and indirectly impact individual white-tailed prairie dogs but ***is not likely to result in a trend towards federal listing of the species***.

Greater Sage-grouse

Direct and indirect impacts to the greater sage-grouse under Alternative D would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Approximately 2,185 acres of sagebrush shrubland, which may provide suitable habitat for sage-grouse in the MBPA, would be disturbed under Alternative D. While it is likely that some sage-grouse use portions of the MBPA on a limited basis, there is no PPH for sage-grouse within the MBPA. The nearest PPH is located approximately 0.6 mile south of the MBPA**.** Additionally, there are no habitats designated as occupied, brood rearing, or winter habitats for sage-grouse within the MBPA. Based on the information above, implementation of Alternative D may impact individual sage-grouse but ***is not likely to result in a trend towards federal listing of the species.***

Bald Eagle

As discussed in **Section 3.10.2.1.7**, no bald eagle nests have been documented in the MBPA. Therefore, direct and indirect impacts to bald eagle nests or nesting activity are not anticipated as a result of Alternative D. However, implementation of Alternative D may affect wintering bald eagles that roost along the Green River corridor and forage within the MBPA. These effects would be similar in scope and nature to those described under the Proposed Action, but of less magnitude.
Implementation of Alternative D would result in the direct, initial short-term loss of approximately 7,768 acres suitable habitat for prey species during the construction of roads, pipelines, well pads, and ancillary facilities, which is 29 percent less than that under the Proposed Action.

Under Alternative D, 63 acres of surface disturbance is proposed within 0.5 mile of identified bald eagle roost locations. Additionally, the risk of being struck by a vehicle would decrease under the Proposed Action, due to a commensurate decrease in traffic levels associated with an estimated 226 miles of new roads under this alternative. Measures to control speed limits and adherence to the removal of big game carcasses from roadsides would be implemented to reduce the potential for vehicle-related collisions with bald eagles.

Overall, Alternative D may directly and indirectly impact individual bald eagles but ***is not likely to result in a trend towards federal listing of the species***.

Golden Eagle and Ferruginous Hawk

Direct and indirect impacts to the golden eagle and ferruginous hawk under Alternative D would be similar in scope and nature to those identified and assessed in **Section 4.9.1.1.6** for raptors and as described under the Proposed Action, but of less magnitude. Vegetation removal associated with Alternative D would result in the loss of approximately 7,768 acres of potential habitat for prey species (e.g., ground squirrels, prairie dogs, and rabbits). Additionally, approximately 1,449 acres of surface disturbance is proposed within 0.5 mile of identified golden eagle nests, and 1,230 acres of disturbance is proposed within 0.5 mile of identified ferruginous hawk nests, which represents a 60 and 59 percent decrease, respectively, over that identified under the Proposed Action.

As with the Proposed Action, implementation of ACEPMs and other conservation measures, including interim and final reclamation as well as adherence to speed limits, would reduce potential impacts to golden eagles and ferruginous hawks under Alternative D. Based on adherence to these measures, Alternative D may affect individual golden eagles and ferruginous hawks but ***is not likely to result in a trend towards federal listing of the species.***

Short-eared Owl

Implementation of Alternative D could result in direct and indirect impacts to the short-eared owl. Direct impacts to short-eared owls could primarily include loss and fragmentation of nesting and foraging habitats. Indirect impacts could include displacement from foraging areas and reduction of prey species' habitat.

Only a single short-eared owl nest has been documented within the MBPA because limited nesting habitat is present within the area. Approximately 3 acres of surface disturbance is proposed within 0.25 mile of this nesting site, which is approximately 12 acres less than that of the Proposed Action. As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for short-eared owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If short-eared owls are documented within a 0.25 mile of any proposed project activities, surface-disturbing activities would not commence until after August 31. Implementation of Alternative D would likely have minimal impacts on short-eared owls. Thus, implementation of Alternative D may affect individual short-eared owls but ***is not likely to result in a trend towards federal listing of the species.***

Burrowing Owl

Direct and indirect impacts to the burrowing owl under Alternative D would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. The UDWR has identified and mapped approximately 11,647 acres of white-tailed prairie dog colonies within the MBPA, which serves as habitat for the burrowing owl. Approximately 916 acres of this habitat would be disturbed under Alternative D. Approximately 114 acres of surface disturbance would occur within 0.25 mile of known burrowing owl nests within the MBPA, which is approximately 52 acres less than that under the Proposed Action.

As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for burrowing owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If burrowing owls are documented within a 0.25 mile of any proposed project activities, surface-disturbing activities would not commence until after August 31. Thus, direct impacts on active burrowing owl nests would be avoided. Based on scope and magnitude of potential impacts to the burrowing owl, Alternative D may affect individual burrowing owls but is ***not likely to result in a trend towards federal listing of the species.***

Lewis's Woodpecker

Direct and indirect impacts to Lewis's woodpecker under Alternative D would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Approximately 4 acres of riparian woodland habitat within the MBPA could be directly affected under Alternative D. Implementation of Alternative D would likely have minimal impacts on Lewis's woodpecker. Thus, implementation of this alternative may affect individual Lewis's woodpeckers but ***is not likely to result in a trend towards federal listing of the species.***

American White Pelican

Similar to the Proposed Action, Alternative D would not result in the direct loss of foraging or nesting habitat to the American white pelican, as no freshwater lakes, rivers, or marshlands exist within the MBPA. Indirect impacts to the American white pelican resulting from Alternative D would be similar in scope and nature to those outlined in the Proposed Action, but would be less in magnitude. Increase in erosion and subsequent sedimentation of MBPA soils into the Green River may reduce the overall habitat quality for prey species of the American white pelican. Additionally, an increase in development activity within the MBPA as a result of Alternative D could result in increased noise and light impacts in adjacent foraging habitats along the Green River; although these impacts would be to a lesser extent than those described under the Proposed Action. While implementation of Alternative D may have minimal impacts on individual American white pelicans, it ***is not likely to result in a trend towards federal listing of the species.***

Long-billed Curlew

Direct and indirect impacts to the long-billed curlew under Alternative D would be similar in scope and nature to those identified under the Proposed Action, but less in magnitude. Approximately 738 (0.6

percent) acres of grassland habitat within the MBPA would be directly affected by Alternative D. As there would be less development within the MBPA, there are likely to be fewer indirect impacts from well development, human presence and habitat fragmentation under Alternative D. While implementation of the No Action Alternative may have minimal impacts on individual long-billed curlew, it ***is not likely to result in a trend towards federal listing of the species.***

Mountain Plover

Direct and indirect impacts to the mountain plover under Alternative D would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Implementation of Alternative D would result in disturbance to approximately 6,411 acres (or about 8 percent of potential habitat within the MBPA) of potential mountain plover habitat. Approximately 21 acres of concentration areas for mountain plover would be impacted under Alternative D, which is 49 acres less than that of the Proposed Action. As such, implementation of Alternative D may impact individual mountain plovers but ***is not likely to result in a trend towards federal listing of the species.***

Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker

Direct and indirect impacts to the roundtail chub, bluehead sucker, and flannelmouth sucker under Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude, especially as surface disturbance within riparian habitats and floodplains would be limited to the water collector well. Implementation of Alternative D may impact individual Colorado River sensitive fish species but ***is not likely to result in a trend towards federal listing of the species.***

Barneby's Catseye

Direct and indirect impacts to Barneby's catseye under Alternative D would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Under Alternative D, approximately 913 acres of pinyon-juniper woodland and sagebrush communities, which serve as potential habitat for Barneby's catseye, would be impacted. Following construction, approximately 462 acres of initial disturbance (51 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of pinyon-juniper woodland and sagebrush communities under Alternative D would be reduced to approximately 451 acres. As with the Proposed Action, implementation of Alternative D may impact individual Barneby's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

Graham's Catseye

Direct and indirect impacts to Graham's catseye under Alternative D would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Under Alternative D, approximately 7,971 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serve as potential habitat for Graham's catseye, would be impacted. Following construction, approximately 4,126 acres of initial disturbance (52 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, desert scrub, and pinyon-juniper woodland vegetation under Alternative D would be reduced to approximately 3,845 acres. As with the Proposed Action, implementation of Alternative D may impact individual Graham's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

Green River Greenthread

Since Green River greenthread is generally confined to white shale slopes and ridges at elevations greater than 5,900 feet in elevation, its potential distribution within the MBPA is extremely limited and direct disturbance to potential habitat for this species is unlikely. Therefore, implementation of Alternative D may impact individual Green River greenthreads but ***is not likely to result in a trend towards federal listing of the species.***

Sterile Yucca

Direct and indirect impacts to sterile yucca under Alternative D would be similar in scope and nature to those described under the Proposed Action, but of less magnitude. Under Alternative D, approximately 1,213 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serve as potential habitat for sterile yucca, would be impacted. Following construction, approximately 591 acres of initial disturbance (48 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation under Alternative D would be reduced to approximately 622 acres. As with the Proposed Action, implementation of Alternative D may impact individual sterile yuccas but ***is not likely to result in a trend towards federal listing of the species.***

4.10.2 Mitigation

In addition to the ACEPMs detailed in **Sections 2.2.12.5** and **2.2.12.7**, there are several proposed conservation measures that could be used to reduce residual impacts to special status plant, fish, and wildlife species. These mitigation measures are detailed in the subsections below.

4.10.2.1 Mitigation Measures for Special Status Raptor Species, Including the Bald Eagle, Golden Eagle, Ferruginous Hawk, Burrowing Owl, Mountain Plover, and Short-eared Owl

- Project-related development in areas directly associated with raptor nest and roost areas would be guided by the use of *Best Management Practices for Raptors and Their Associated Habitats in Utah* (found in Appendix A of the Vernal RMP [BLM 2008b]) and the *USFWS Utah Field Office's Guidelines for Raptors Protection from Human and Land Use Disturbances* (Romin and Muck 2002) that use seasonal and spatial buffers as well as mitigation to maintain and enhance raptor nesting and foraging habitat, while allowing for other resource uses.

- All applicable surface stipulations from Appendix K and Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.

- Electric distribution and transmission structures would be designed according to criteria presented in *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (APLIC 2006). In addition, strategies for minimizing collision risk with power lines would follow criteria presented in *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012).

- Between March 1 and August 31, new construction or surface-disturbing activities would not occur within 0.25 miles of active burrowing owl and short-eared owl nests.

- Between May 1 and June 15, new construction or surface-disturbing activities would not occur in mountain plover habitat to protect the species during the breeding and nesting season.

4.10.2.2 Mitigation Measures for Colorado River System Endangered and Sensitive Fish

- Newfield and its contractors would locate, handle, and store hazardous substances in locations that would prevent accidental spill or delivery to the Green River or its tributaries.
- Natural gas-condensate pipelines that cross mapped 100-year floodplain, mapped riparian, or wetland areas would be routinely pigged and would have emergency shutoff valves located immediately outside the floodplain.
- Natural gas pipelines that cross perennial, intermittent, and ephemeral stream channels would be buried below the predicted scour depth for an equivalent flood event. The construction requirements for each type of crossing would be determined on a site-specific basis and would consider the technical guidance of the document entitled, "Hydraulic Considerations for Pipeline Crossings of Stream Crossings," which is found in Appendix B of the Vernal RMP (BLM 2008b).
- Natural gas pipelines that cross perennial, intermittent, and ephemeral stream channels would have automatic shutoff valves directly beyond the area at risk of flooding to reduce the magnitude of contamination in the event of an accidental pipeline break.
- Natural gas pipelines that cross perennial, intermittent, and ephemeral stream channels would be buried at least 5 feet below the channel bottom.
- With the exception of the water collector well, wells proposed within the Green River's 100-year floodplain would be relocated to non-floodplain areas or drilled directionally from beyond the floodplain.
- Wells proposed in all 100-year floodplains within 3 miles of the Green River would use measures including the use of closed-loop drilling methods, berming, and secondary containment of all tanks and pits, as well as drilling during non-flood prone seasons.
- All applicable BLM-committed Conservation Measures for Colorado River fishes, as described in Appendix L of the Vernal RMP (BLM 2008b), would be used as needed to mitigate potential impacts to endangered and sensitive fishes and their habitat.
- To avoid entrainment, water would be pumped from an off-channel location - one that does not connect to the river during high spring flows. An infiltration gallery constructed in a location approved by USFWS would be used.
- If the pump head is located in the river channel, the following stipulations would apply:
    - The pump would not be situated in a low-flow or no-flow area, because these habitats tend to concentrate larval fishes.
    - The amount of pumping would be limited, to the greatest extent possible, during that period of the year when larval fish may be present (April 1- August 31).

- o The amount of pumping would be limited, to the greatest extent possible, during the midnight hours (10 PM to 2 AM), because larval drift studies indicate that this is the period of greatest daily activity. Dusk is the preferred pumping time, because larval drift abundance is lowest during this time.
- o All pump intakes would be screened with 3/32-inch mesh material.
- o Approach velocities for intake structures would follow the National Marine Fisheries and USFWS document “Fish Screening Criteria for Anadromous Salmonids.” For projects with an in-stream intake that operate in stream reaches where larval fish may be present, the approach velocity would not exceed 0.33 feet per second.
- o Any fish impinged on the intake screen or entrained into irrigation canals would be reported to the USFWS (801-975-3330) or to the UDWR Northeastern Region, located at 318 North Vernal Avenue, Vernal, UT 84078 (435-781-9453).

- For all tributaries that drain directly to Pariette Draw or directly to the Green River, roads and well pads would be set back a minimum of 300 feet from the active stream channel (average 3-feet wide or greater without an associated riparian zone), unless site specific analysis demonstrates that 1) the proposed well or road could be placed on higher terrain above the 100-year floodplain, 2) the 100-year floodplain can be demonstrated to be narrower than 200 feet in the area proposed for well location; or 3) the well pad or road can be increased in height to avoid a predicted over-topping 50-year flood. In these situations, the well pad or road would not be placed closer than 100 feet from the stream channel.

- All new stream crossings would be kept to a minimum. In the case of an unavoidable stream crossing, culverts would be designed and constructed to allow fish passage. All stream crossings would be designed and constructed to keep impacts to riparian and aquatic habitat to a minimum.

- Appropriate BMPs needed to mitigate water impacts anticipated to occur from surface-disturbing activities would be identified during the onsite process and may include, but would not be limited to, proper culvert design, installation of energy dissipation devices, proper site selection (avoidance of steep slopes, riparian areas, wetlands, areas subject to severe soil movement, and areas of shallow groundwater and natural watercourses), and using closed-loop drilling.

4.10.2.3 Mitigation Measures for Special Status Plant Species, Including the Uinta Basin Hookless Cactus, Pariette Cactus, Ute Ladies’-tresses, Barneby’s Catseye, Graham’s Catseye, and Sterile Yucca

Sclerocactus Surveys

- Pre-project habitat assessments will be completed across 100% of the project disturbance area within potential habitat prior to any ground-disturbing activities to determine if suitable *Sclerocactus* habitat is present.
- Pre-construction *Sclerocactus* surveys will occur following the pre-project habitat assessments that identified any potential habitat within the project area. These pre- construction surveys must follow U.S. Fish and Wildlife Service (USFWS) Utah Field Office Guidelines for Conducting and Reporting Botanical Inventories and Monitoring of Federally Listed, Proposed, and Candidate Plants. Surveys will be conducted in potential habitat prior to initiation of project activities, at a time when the plant can be detected, and during appropriate flowering periods:

  - *Sclerocactus brevispinus* surveys must be conducted between March 15th and June 30th, unless an extension is provided in writing by the USFWS,
  - *Sclerocactus wetlandicus* surveys can be done any time of the year, provided there is no snow cover.
- *Sclerocactus* surveys will be conducted by a qualified botanist. Qualifications are defined in the USFWS Utah Field Office Guidelines for Conducting and Reporting Botanical Inventories and Monitoring of Federally Listed, Proposed and Candidate Plants, http://www.fws.gov/utahfieldoffice/SurveyorInfo.html. Qualified botanists must also attend the USFWS Uinta Basin Rare Plant Workshop, http://www.fws.gov/utahfieldoffice/UBRarePlants.html.
- *Sclerocactus brevispinus* and *S. wetlandicus* Survey Methods and Protocol:
  - Initial pre-disturbance 100% clearance surveys will be conducted following standard methodology and will be valid for a period of 4 years.
    - If more than 4 years pass between the original surveys and construction, a new 1 00% clearance survey will be required.
    - If construction is to occur within the 4 year window, an additional, reduced-effort "spot check" survey will be conducted following the below methodology in the year of project construction.
- Sclerocactus Spot Check Survey Methods:
  - Spot checks will be conducted by qualified individuals according to BLM and Service standards for plant surveyors (i.e. attendance at Uinta Basin Rare Plant Workshop, qualifying education and experience).
  - Spot check surveys will occur during the year of construction.
  - Timing limitations for spot check surveys will follow existing protocols for regular surveys:
  - *S. brevispinus*: March 15 through June 30 unless extended by prior written approval by the Service;
  - *S. wetlandicus*: During any time of year with no snow cover.
- Within 30 feet (10 meters) of the perimeter of the previous survey, spot check surveys will occur at a moderate intensity (survey lines spaced 10 feet or so apart at a moderately slow speed; this can be done via a meander survey method) except in the following locations:
  - Original survey areas that are within 300 feet and downslope of known plant locations, where seeds are likely to disperse during rain events. Locations meeting this criteria will require 100% clearance surveys.
  - Areas immediately adjacent to ant mounds/colonies that fall within the original 1OO% clearance survey boundary. Another known mechanism for *Sclerocactus* seed dispersal is harvester ants, so the area immediately adjacent to active and inactive ant mounds (approximate 10 foot diameter) should be surveyed following standard survey protocols for new germinants of Sclerocactus.
- Surveys will be completed prior to any ground disturbing activities. Operators may not proceed on the basis of a preliminary negative spot check survey.

- Biological reports of the spot check survey will be submitted to the BLM authorizing official, and the authorizing official will provide written approval to the operator to proceed with the project.
- Spot check biological reports will also be submitted to the Service so that the Service may evaluate the efficacy of these survey methods.
- The BLM authorizing official can halt construction as necessary based on new plant location information obtained from sources other than the operator or the contractor hired by the operator.
    - *Sclerocactus* surveys for access roads, buried pipelines, well pads, and other facilities requiring removal of vegetation (e.g., compressor stations) will include the project area and/or right-of-way (ROW), and 300 feet from the edges of the project disturbance and/or ROW.
    - *Sclerocactus* surveys for surface pipelines placed within an existing road ROW, and within 10 feet from the edge of the disturbed surface of the road, will include the ROW and 50 feet from the edge of the ROW on the pipeline side of the road.
    - *Sclerocactus* surveys for cross-country surface pipelines (pipelines over 10 feet from a road), where the pipeline will be laid by hand with minimal disturbance and no vehicle use, will include the ROW and 50 feet from the edges of both sides of the ROW.
    - Surveys for all other cross-country surface pipelines (vehicles or equipment used, not laid out by hand) will include the ROW and 300 feet from the edges of both sides of the ROW.
    - *Sclerocactus* surveys will not be necessary when pipelines are buried in existing roads.

PROJECTS PROPOSED WITHIN *SCLEROCACTUS* HABITAT

General Measures

- Ground disturbing activities in potential *Sclerocactus* habitat, and within 300 feet of individual *Sclerocactus* plants and/or populations, must occur outside of the flowering period, April 1 - May 30 (and in accordance with Core Area 1 and Core Area 2 conservation recommendations, as outlined below).

- Access roads, buried pipelines, well pads, and other facilities requiring removal of vegetation (e.g., compressor stations) will be located a minimum distance of 300 feet from individual *Sclerocactus* plants and/or populations where feasible (and in accordance with Core Area 1 and Core Area 2 conservation recommendations, as outlined below).

- Surface pipelines will be located at a minimum of 50 feet from individual *Sclerocactus* plants and/or populations where feasible (and in accordance with Core Area 1 and Core Area 2 conservation recommendations, as outlined below).

- Existing surface pipelines located closer than 50 feet to known *Sclerocactus* individuals will be secured in place to prevent pipeline movement (and in accordance with Core Area 1 and Core Area 2 conservation recommendations, as outlined below).

- Only water (no chemicals, reclaimed production water or oil field brine) will be used for dust abatement measures within cactus habitat.

- Dust abatement will be employed in potential *Sclerocactus* habitat over the life of the project during the time of the year when *Sclerocactus* species are most vulnerable to dust-related impacts (March through August).

- Noxious weeds within *Sclerocactus* habitat may be controlled with herbicides, in accordance with the BLM Herbicide PEIS (http://www.blm.gov/wo/st/en/prog/more/veg_eis.html) Guidelines and the BLM's Standard Operating Procedures for Threatened and Endangered Plant Species (Table 1).

- Application for a Pesticide Use Permit will include provisions for mechanical removal, as opposed to chemical removal, for Utah Class A, B, and C noxious weeds within 50 feet of individual/populations of *Sclerocactus*.

- Erosion control measures (e.g., silt fencing) will be implemented to minimize sedimentation to *Sclerocactus* plants and populations located down slope of proposed surface disturbance activities, and should only be implemented within the area proposed for disturbance.

- All disturbed areas will be reclaimed with plant species native to Utah, or seed mixtures approved by the BLM and USFWS.

- Design project infrastructure to minimize impacts within potential habitat:

    - Reduce well pad size to the minimum needed, without compromising safety;
    - Limit new access routes created by the project;
    - Roads and utilities should share common ROWs where possible;
    - Reduce width of ROWs and minimize the depth of excavation needed for the road bed or use the natural ground surface for the road within habitat where feasible;
    - Place signing to limit off-road travel in sensitive areas;
    - Stay on designated routes and other cleared/approved areas; and
    - All disturbed areas will be re-vegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

- Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:

    - Follow the above (#C) recommendations for project design within potential habitats;
    - Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.;
    - Where technically and economically feasible, use directional drilling or multiple wells from the same pad;
    - Designs will avoid concentrating water flows or sediments into occupied habitat;
    - Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat;
    - Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible;

Core Conservation Area Level 1 (CCA1):

- Avoid new surface disturbance, including well pads, roads, pipelines, or any other surface-disturbing activities except as allowed by the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus (see Biological Assessment – Attachment to Appendix J, Biological Opinion). Expansion of existing facilities will be allowed - e.g., widening existing access roads, expanding well pads, installation of pipelines to access existing facilities (along existing alignments or roadways).

- Where access roads are widened, well pads are expanded, or buried pipelines access existing facilities, design projects to minimize impacts:

  - Locate project a minimum distance of 300 feet from individual *Sclerocactus* plants and/or populations (except for surface pipelines which is 50 feet).
  - Utilize existing well pads and infrastructure.
  - Use common ROWs for roads and utilities where possible.
  - Place signing to limit off-road travel in sensitive areas.

- When new surface disturbance occurs within the CCA1 area, a monetary amount will be contributed to the *Sclerocactus* Mitigation Fund to aid in the recovery of *Sclerocactus* species impacted by the project.

- Where new surface disturbance directly affects *Sclerocactus* (cacti are directly removed), a monetary amount[12] will be contributed to the Sclerocactus Mitigation Fund to aid in the recovery of *Sclerocactus* species impacted by the project. These contributions are in addition to payments requested for indirect effects to cacti (see previous measure). Contributions will be negotiated between the Operator and the USFWS based on the number of cacti directly impacted and in relation to the USFWS' current management guidelines for *Sclerocactus*.

- Funds will be paid to:

  Sclerocactus Mitigation Fund
  Michelle Olson, Manager
  Impact-Directed Environmental Accounts
  National Fish and Wildlife Foundation
  1133 Fifteenth Street NW, Suite 1100
  Washington, DC 20005

Core Conservation Area Level 2 (CCA2):

- New surface disturbance, including well pads, roads, pipelines, or any other surface-disturbing activities will not exceed a 5% surface disturbance threshold except as allowed by the

[12] The amount is based on an estimate for the cost to grow and transplant a cactus to the wild. We are in the process of receiving additional quotes and may need to modify this figure for an average overall cost.

FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus (see Biological Assessment – Attachment to Appendix J, Biological Opinion).

- If the total cumulative surface disturbance is below the 5% threshold, and where access roads, buried pipelines, well pads, or other facilities requiring removal of vegetation (e.g., compressor stations) will be constructed, design project to minimize impacts:

    - Locate project a minimum distance of 300 feet from individual *Sclerocactus* plants and/or populations (except for surface pipelines which is 50 feet).

- If the total cumulative surface disturbance is above the 5% threshold, and/or where new surface disturbance indirectly affects *Sclerocactus* (cactus within 300 feet of proposed disturbance), a monetary amount will be contributed to the Sclerocactus Mitigation Fund to aid in the recovery of *Sclerocactus* species impacted by the project.

- Where new surface disturbance directly affects *Sclerocactus* (cacti are directly removed), a monetary amount will be contributed to the Sclerocactus Mitigation Fund to aid in the recovery of *Sclerocactus* species impacted by the project. These contributions are in addition to payments requested for indirect effects to cacti (see previous measure). Contributions will be negotiated between the Operator and the USFWS based on the number of cacti directly impacted and in relation to the USFWS' current management guidelines for *Sclerocactus*.

- Funds will be paid to:

  Sclerocactus Mitigation Fund
  Michelle Olson, Manager
  Impact-Directed Environmental Accounts
  National Fish and Wildlife Foundation
  1133 Fifteenth Street NW, Suite 1100
  Washington, DC 20005

Sclerocactus Potential Habitat Polygon:

- Where access roads, buried pipelines, well pads, or other facilities requiring removal of vegetation (e.g., compressor stations) will be constructed, design project to minimize impacts:

- Locate project a minimum distance of 300 feet from individual *Sclerocactus* plants and/or populations (except for surface pipelines which is 50 feet).

- Where new surface disturbance indirectly affects *Sclerocactus* (cactus within 300 feet of proposed disturbance), a monetary amount will be contributed to the Sclerocactus Mitigation Fund to aid in the recovery of *Sclerocactus* species impacted by the project.

- Where new surface disturbance directly affects *Sclerocactus* (cacti are directly removed), a monetary amount will be contributed to the Sclerocactus Mitigation Fund to aid in the recovery of *Sclerocactus* species impacted by the project. These contributions are in addition to payments requested for indirect effects to cacti (see previous measure). Contributions will be negotiated between the Operator and the USFWS based on the number of cacti directly impacted and in relation to the USFWS' current management guidelines for *Sclerocactus*.

- Funds will be paid to:

  Sclerocactus Mitigation Fund
  Michelle Olson, Manager
  Impact-Directed Environmental Accounts
  National Fish and Wildlife Foundation
  1133 Fifteenth Street NW, Suite 1100
  Washington, DC 20005

- All applicable surface stipulations from Appendix K and Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.

4.10.2.4 Mitigation Measures for the White-Tailed Prairie Dog

In accordance with the Conditional Use Stipulations included in Appendix K of the Vernal RMP and ROD:

- Do not allow surface-disturbing activities within 660 feet of prairie dog colonies identified within prairie dog habitat. No permanent aboveground facilities are allowed within the 660-foot buffer.
  - Exception: An exception may be granted if the applicant submits a plan that indicates that impacts of the proposed action can be adequately mitigated or, if due to the size of the town, there is no reasonable location to develop a lease and avoid colonies the Field Manager will allow for loss of prairie dog colonies and/or habitat to satisfy terms and conditions of the lease.
  - Modification: The Field Manager may modify the boundaries of the stipulation area if portions of the area does not include prairie dog habitat or active colonies are found outside the current defined area, as determined by the BLM.
  - Waiver: May be granted if, in the leasehold, it is determined that habitat no longer exists or has been destroyed.

4.10.2.5 Mitigation Measures for Western Yellow-Billed Cuckoo

- Prior to any surface-disturbing activity within WYBC habitat during the June 1 through August 1 breeding season, surveys would be conducted by a qualified biologist to determine if breeding or nesting WYBC are present. If WYBC are present, surface disturbance or drilling activity would be precluded within one mile of occupied habitat to avoid disturbance to breeding birds or nests.

4.10.3 Unavoidable Adverse Impacts

Adverse impacts to special status plant, fish, and wildlife species would occur under all of the alternatives to varying degrees, depending on the number of wells. Unavoidable adverse impacts from the proposed project that could not be fully mitigated include the following:

- Long-term losses of potential habitat useful for the survival or recovery of special status plant, fish, and wildlife species.
- Fragmentation of special status plant, fish, and wildlife habitat from well pads, pipelines, roads, and ancillary features.
- Water depletion from the Colorado River Basin resulting in impacts to Colorado River endangered and sensitive fish species.

4.10.4 Irretrievable and Irreversible Commitments of Resources

Any losses of potential habitat necessary for the survival or recovery of special status plant, fish, and wildlife species would be irretrievable until disturbed areas were actively and adequately restored. The fragmentation of habitat for special status plant, fish, and wildlife species from well pads, pipelines, roads, and ancillary features would be irretrievable until these features were removed and reclaimed following project completion. The increased spread of invasive weeds into the habitat of special status species would be either irretrievable or irreversible, depending on the success of weed eradication efforts. Impacts related to the depletion of flows and increased sedimentation in the Green River would be an irreversible impact. Where the alteration of plant habitat cannot be reclaimed, such as the disturbance of BSCs or other soils required by special status plants, these impacts would be irreversible as well.

4.10.5 Relationship of Short-Term Uses to Long-Term Productivity

Construction of roads, well pads, pipelines, and ancillary facilities would provide a short-term use that would result in long-term loss and fragmentation of habitat for special status species. Noxious weed invasion into the habitat of special status plant, fish, and wildlife species would also be a long-term effect of construction and project-related activities, and could affect the long-term productivity of habitats that are invaded.

4.10.6 CULTURAL RESOURCES

Under all alternatives, adverse effects to historic properties in the MBPA would include an increased risk of physical alteration, damage, or destruction, and/or alteration of the character or setting of a property. These effects would result from activities associated with surface or subsurface disturbance (i.e., road building, pipeline construction, and well-pad development). This would also apply to archaeological sites or locations determined to be sacred or of traditional importance to Native American tribes, where visual impacts, dust, traffic, and/or increased noise levels may impact that use.

Potential adverse effects to cultural resources as a result of the proposed project are minimized through compliance with Section 106 of the NHPA and with ACEPMs detailed in **Section 2.2.12.8**. Compliance with Section 106 mandates the identification of historic properties within the development area that may be affected under each of the alternatives and provides a framework for consultation to resolve adverse effects.

The ACEPMs for this project reinforce Section 106 requirements. These proposed measures specifically include:

- Consultation with SHPO and Native American Tribes
- A Class III inventory for all areas proposed for surface disturbance
- Avoidance of NRHP-eligible historic properties whenever feasible
- Mitigation of adverse effects
- Informing workers about relevant regulations
- Cessation of construction activities in the event of archaeological discoveries

4.11 Direct and Indirect Effects

Cultural resources located in the MBPA are non-renewable, and unknown or undetected resources could be directly affected and irreversibly damaged or destroyed by ground-disturbing activities such as well pad development, road construction, and secondary surface activities (e.g., vehicular and pedestrian traffic). Because there is the potential for archaeological sites in the MBPA to be shallow, these cultural deposits could also be damaged or destroyed by vegetation clearing, right-of-way blading, or soils excavation. Standing historic buildings or structures are more visible than archaeological deposits and are more easily avoided during ground-disturbing activities.

Historic and prehistoric cultural resources may also be subject to indirect effects, including an increased risk of vandalism, surface artifact collection, visual intrusion, unauthorized excavation, and OHV traffic because of improved access to the area from new and upgraded roads or production and distribution lines. Fugitive dust has the potential to affect cultural resources by coating artifacts, features, and rock art panels with dust. Typical dust suppression methods, including the application of water or chemical suppressants to unimproved roads, are generally sufficient to limit the distance dust travels from its point of origin. As such, those sites directly adjacent to roads or similar facilities would be most at risk.

Direct and indirect effects could result in the loss of research potential or enhancement through scientific study, the loss of recreational opportunities and interpretation, the loss of management options for the BLM, or the alienation of place, setting, and feeling. The degree of threat to cultural resource sites would depend on their location relative to proposed project facilities and new access roads and on the efforts taken by the project proponents to minimize or eliminate the threats at the time facilities are constructed.

4.11.1.1 Alternative A - Proposed Action

Under the Proposed Action, the proposed project would directly affect at least 16,129 acres in the MBPA. Given the average site density of six sites per square mile, approximately 150 sites potentially could be located in proposed new disturbance areas. Construction of well pads, reserve pits, access roads, pipelines, compressor stations, the central gas processing plant, water treatment and injection facilities, GOSPs, pump stations, and well drilling, as well as operation and maintenance activities, could directly affect cultural resources and contribute to an alteration of the overall setting and feeling of the MBPA.

Such changes in the MBPA could result in the adverse effects as outlined above in **Section 4.11.1**. An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association (36 CFR 800.5[a][1]).

Adverse effects include:

- Physical destruction of or damage to all or part of the property.
- Alteration or removal of a property from its historic location
- Change in the character of the property's use or the physical features within the property's setting.
- Introduction of visible, audible, or atmospheric elements out of character with the significant historic features of the property.
- Neglect leading to deterioration or vandalism.
- Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance (36 CFR 800.5[a][2]).

The above-mentioned adverse effects are unlikely to occur because of implementation of the ACEPMs identified in **Section 2.2.12.8** of this EIS and compliance with Section 106 of the NHPA. Dust control ACEPMs outlined in **Section 2.2.12.1** would also be implemented to reduce indirect effects to cultural resources.

4.11.1.2 Alternative B - No Action Alternative

Under the No Action Alternative, the proposed project could directly affect at least 870 acres in the MBPA as a result of other oil well development projects. Given the average site density of six sites per square mile, approximately eight potential sites could be located in proposed new disturbance areas. Surface-disturbing activities including construction of well pads, access roads, pipelines, and central facilities could directly affect cultural resources. Aboveground facilities, secondary surface activities, and operation and maintenance activities could indirectly affect cultural resources and contribute to an alteration of the overall setting and feeling of the MBPA.

The direct and indirect effects of the No Action Alternative would be similar to those outlined under the Proposed Action, but their extent would be reduced. Fewer acres would be affected, field-wide electrification would not be developed, and reduced numbers of well pads, wells, access roads, pipelines, and facilities would be required.

4.11.1.3 Alternative C - Field-Wide Electrification

Under Alternative C, direct and indirect effects due to surface disturbance would be similar to those described under the Proposed Action. However, developments under Alternative C would directly affect approximately 20,112 acres, which include 55 additional acres for 11 new substations and 3,927 acres for the installation of proposed transmission and distribution lines. This initial surface disturbance would be nearly identical to that of the Proposed Action, except that Alternative C would have an additional 3,983 acres of total surface disturbance due to the installation of transmission lines, distribution lines, and substations. Given the average site density of six sites per square mile, approximately 186 potential sites could be located in proposed new disturbance areas under Alternative C.

As outlined in the Proposed Action, adverse effects are unlikely because of implementation of the ACEPMs identified in **Section 2.2.12.8** of this EIS and compliance with Section 106 of the NHPA. Dust control ACEPMs outlined in **Section 2.2.12.1** would also be implemented to reduce indirect effects to cultural resources.

4.11.1.4 Alternative D – Agency Preferred Alternative

Development of the well pads, access roads, pipelines, and central facilities would result in approximately 10,122 acres of surface disturbance, which is 6,007 fewer acres than those affected by the Proposed Action. Given the average site density of six sites per square mile, approximately 96 potential sites could be located in proposed new disturbance areas.

Under Alternative D, direct and indirect effects due to surface disturbance would be similar to those described under the Proposed Action. However, under Alternative D, the extent of direct and indirect effects would be reduced and are unlikely to be adverse.

4.11.2 Section 106 Consultation

See **Section 6.2.3**.

4.11.3 Mitigation

No additional mitigation measures beyond the ACEPMs detailed in **Sections 2.2.12.1** and **2.2.12.8** are recommended for cultural resources.

4.11.4 Unavoidable Adverse Effects

For each alternative in this study, there is potential for unavoidable adverse impacts to cultural resources, despite compliance with Section 106 and ACEPMs. The greatest risk is the destruction of or impacts to unknown and undetected sites. As indicated in the previous sections, adherence to relevant cultural resource regulations would provide opportunities for mitigation of the majority of these impacts. Conducting the required cultural surveys prior to construction activities would also reduce this potential.

4.11.5 Irretrievable and Irreversible Commitments of Resources

The location and nature of all cultural resources in the study area is unknown. Therefore, it is not possible to determine if there would be irreversible and/or irretrievable impacts to cultural resources or what these impacts might be. All of the alternatives being considered have the potential to cause impacts. Following all relevant cultural resource regulations would provide opportunities to minimize the impacts and to gather additional information regarding these resources. However, any physical impact to a cultural resource is essentially impossible to restore. Accordingly, there is some risk of irreversible impacts to cultural resources if these resources are unknown and are not detected during project implementation.

4.11.6 Relationship of Short-Term Uses to Long-Term Productivity

Proper mitigation and compliance with Section 106 would reduce, but not eliminate, impacts to long-term productivity of cultural resources due to short-term oil and gas development. Therefore, short-term oil and gas development would impact long-term productivity of cultural resources through the destruction of these resources during ground-disturbing activities.

4.12 LAND USE AND TRANSPORTATION

This section of the EIS describes the potential impacts of project development on land uses within the MBPA. It also describes the impacts the project would have on transportation, including impacts on traffic, the existing roadway system, and additional access roads. Impacts of project development on traffic accidents are also examined.

As mentioned in **Section 3.12**, the primary land uses within and adjacent to the MBPA include oil and gas development, livestock grazing, hunting, and dispersed recreation. Along the northern boundary of the MBPA, adjacent to Pariette Wash, lands have been developed for agricultural uses; however, there is minimal cultivated cropland outside of this area. No commercial buildings/facilities or private residences currently exist within the MBPA, and there are no residential communities present.

Table 4.12-1 summarizes the initial surface disturbance to surface land owners by each alternative (see **Table 1.1-1** for a summary of land ownership). Total initial surface disturbance includes disturbance resulting from the construction of well pads, access roads, pipelines, and other infrastructure.

TABLE 4.12-1
SURFACE DISTURBANCE WITHIN THE MBPA
BY SURFACE OWNER AND ALTERNATIVE

Surface Owner	Surface Acres	Existing Disturbance (acres)	Initial Surface Disturbance (acres)			
			Alt. A – Proposed Action	Alt. B – No Action	Alt. C – Field-wide Electrification	Alt. D – Agency Preferred Alternative
BLM	103,912	3,215	13,726	76	16,629	8,646
State of Utah	12,886	412	1,718	599	2,128	1,103
Private	2,976	98	483	130	581	218
Tribal	30	0	3	0	6	2
Totals	**119,804**	**3,725**	**15,930**	**805**	**19,344**	**9,968**

4.12.1 Direct and Indirect Effects

4.12.1.1 Alternative A - Proposed Action

4.12.1.1.1 Land Use

Under the Proposed Action, construction of up to 5,750 wells and associated well pads, access roads, pipelines, and facilities would result in the initial disturbance of approximately 15,930 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 7,527 acres (see **Table 2.3-1**). Approximately 85 percent of the proposed initial surface disturbance would occur on BLM-administered lands. Of the remaining initial disturbance area, approximately 12 percent would occur on State lands and about 3 percent would occur on private lands. Approximately three acres of tribal land would be initially disturbed.

As described in **Section 3.12**, oil and natural gas exploration and development is a primary land use within the MBPA. Infill development under the Proposed Action would increase the levels of construction, drilling, completion, and production activities already occurring in the MBPA and would contribute to the general semi-industrial setting. Construction of additional pipelines and increased traffic on roads co-located with pipelines may potentially impact the integrity of existing ROWs within the MBPA. In addition, increased traffic would increase the risk of vehicle accidents that could result in damage or rupture to surface pipelines adjacent to roads. However, because nearly all existing ROWs in the MBPA are used for ongoing well field operations, and because all proposed pipelines would be buried, minimal adverse impacts to existing ROWs would occur. Potential conflicts with existing ROWs could be resolved on a site-specific basis, including the use of applicable Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b). Mitigation measures addressing potential impacts to transportation, range resources, fish and wildlife, and recreation are detailed in their respective sections of **Chapter 4.0**, as appropriate. Potential impacts to other land uses under the Proposed Action would include:

- Increased access to the MBPA due to new road construction, elevated industrial traffic, and potential increases in traffic-related conflicts between industry and recreational users (see **Section 4.13**, *Recreation*);
- Loss of livestock forage and potential impacts to grazing activities (see **Section 4.8**, *Range Resources*);
- Loss of wildlife habitat and displacement of wildlife due to surface disturbance, habitat fragmentation, and increased human presence due to infill development activity (see **Section 4.9**, *Fish and Wildlife*); and
- Changes in recreational opportunity (e.g., increased access for OHV users, decreased opportunity for primitive recreation). See **Section 4.13**, *Recreation*.

4.12.1.1.2 Transportation

Under the Proposed Action, new roads would be constructed as needed to provide access to the proposed new wells. In addition to the approximately 363 miles of roads already in place to service existing facilities, an estimated 243 miles of new roads would be necessary to access the new wells that would be developed under the Proposed Action.

Transportation resources would be impacted through additional vehicle trip generation. These would be greatest during the well drilling and completion phases of the project. The projected maximum daily increase in trips per day for the Proposed Action would be 25 heavy truck trips and 10 light truck trips per well during well drilling and completion (BLM 2010). This would result in an additional traffic volume of approximately 35 total trips per day per well during peak well completion.

Vehicle trips also would be generated during well production, routine well maintenance, and periodic well stimulation and removal of produced water. The average number of trips per well during well production would be 111 annually, or approximately 0.30 per day (Felzburg et al. 2012). Therefore, the Proposed Action would generate approximately 1,725 trips per day upon completion of well development. However, it should be noted that this calculation assumes one well per well pad. As mentioned in **Chapter 2.0**, *Proposed Action and Alternatives*, multiple wells may be located on one well pad, which would reduce the actual number of trips. In addition, most of these trips would be made by relatively few vehicles, so actual traffic volumes on the roads would not be as great as the number of trips. **Table 4.12.1.1.2-1** shows the number of vehicle trips and miles traveled per day that would be generated under each alternative.

**TABLE 4.12.1.1.2-1
ESTIMATED VEHICLE TRIPS AND MILES TRAVELED
WITHIN THE MBPA BY ALTERNATIVE**

	Alt. A – Proposed Action	Alt. B – No Action	Alt. C – Field-wide Electrification	Alt. D – Agency Preferred Alternative
Vehicle Trips per Day - Construction	35	35	35	35
Vehicle Trips per Day - Well Operations	1,725	233	1,725	1,725
Vehicle Miles Traveled per Day – Well Operations	29,900	4,046	29,900	29,900

Although the exact volume is unknown, it is expected that much of the anticipated traffic generated under the Proposed Action would use U.S. 40/U.S. 191 between Roosevelt and Vernal, as this is the main highway in the vicinity of the MBPA. As discussed in **Section 3.12.2.1**, much of the traffic on these roads consists of oil tanker trucks that visit producing wells in the MBPA each day.

Neither the UDOT nor the County Roads Departments has specific information on the capacity of maintained gravel roads in the MBPA. However, UDOT was able to verbally confirm that a 28-foot-wide, paved, two-lane rural county road with no turn lanes would have a Level of Service rating of A and a corresponding capacity of up to 6,000 vehicles per day (BLM 2010). UDOT assumed that the capacity range for a maintained gravel road would be less than a paved, two-lane rural county road, but was not able to cite a specific capacity range. As noted above, the projected maximum daily increase in trips per day for the Proposed Action would be 25 heavy truck trips and 10 light truck trips per well during well drilling and completion, and an average of 0.30 trips per day during well production. Therefore, a paved, two-lane rural county road would likely accommodate traffic generated by the Proposed Action. Since no capacity range has been provided, it is not known if a maintained gravel road would accommodate this traffic.

During well field operation, it is estimated there would be a total of 2.4 vehicle miles of light truck traffic per well per day and 2.8 vehicle miles of heavy truck traffic per well per day. Vehicle miles driven per well per day were calculated based on well pad spacing, barrels of produced water, capacity of water trucks, and miles associated with well servicing. The light truck traffic would include pumpers (maintenance workers) and workover crews, while heavy truck traffic would consist of water trucks hauling produced water from each well (BLM 2010). The total amount of vehicle miles traveled during well operations under the Proposed Action would be 5.2 vehicle miles per well multiplied by the number of wells, or approximately 29,900 total vehicle miles per day.

An increase in traffic within the MBPA and the surrounding transportation network would be evident during the LOP. Information contained in the Draft EIS for the Greater Natural Buttes Project reported there were three spills (two minor) in 1 year that occurred in conjunction with servicing existing wells. The resulting accident probability rate is 1.6 percent per well, or 0.02 accidents for each well serviced (BLM 2010). Based on this estimate, the Proposed Action could result in as many as 115 accidents annually, once all of the wells have been drilled and are in operation. The majority of these accidents would be minor.

Newfield would implement ACEPMs detailed in **Section 2.2.12**. To minimize impacts, Newfield would attempt to use the existing road network to the extent practical. Furthermore, the use of telemetry to monitor wells would reduce the frequency of well visits, thereby reducing the amount of potential vehicle traffic within the MBPA.

4.12.1.2 Alternative B - No Action Alternative

4.12.1.2.1 Land Use

Under Alternative B, construction of up to 788 wells and pads, associated access roads, pipelines, and facilities would result in the initial disturbance of approximately 805 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 617 acres (see **Table 2.4-1**). Approximately 12 percent of the proposed initial surface disturbance would occur on BLM-administered lands. Of the remaining initial disturbance area, approximately 73 percent would occur on state lands and about 16 percent would occur on private lands (see **Table 4.12-1**). No tribal land would be disturbed.

As described in **Section 3.12**, oil and natural gas exploration and development is a primary land use within the MBPA. Infill development under the No Action Alternative would increase the levels of construction, drilling, completion, and production activities already occurring in the MBPA, although the level of development would be significantly less than what would be expected under the Proposed Action. Construction of additional pipelines and increased traffic on roads co-located with pipelines may potentially impact the integrity of existing ROWs within the MBPA. In addition, increased traffic would increase the risk of vehicle accidents that could result in damage or rupture to surface pipelines adjacent to roads. However, this impact would be less than what would occur under the Proposed Action. Also, because nearly all existing ROWs in the MBPA are used for ongoing well field operations, and because all proposed pipelines would be buried, minimal adverse impacts to existing ROWs would occur. As with the Proposed Action, any potential conflicts with existing ROWs could be resolved on a site-specific basis. Mitigation measures addressing potential impacts to transportation, range resources, fish and wildlife, and recreation are detailed in their respective sections of **Chapter 4.0**, as appropriate.

Potential impacts to other land uses under Alternative B would be similar to those described under the Proposed Action (see **Section 4.12.1.1.1**); however, these impacts would be less because fewer wells would be developed.

4.12.1.2.2 Transportation

Under Alternative B, new roads would be constructed as needed to provide access to the proposed new wells. In addition to the approximately 45 miles of roads already in place to service existing facilities, an estimated 23 miles of new roads would be necessary to access the new wells developed under this alternative.

Transportation resources would be impacted through additional vehicle trip generation. These would be greatest during the well drilling and completion phases of the project. The projected maximum daily increase in trips per day under Alternative B would be the same as what would take place under the Proposed Action (i.e., approximately 35 total trips per day per well during peak well completion). When this number is added to the existing traffic counts, the resulting new potential average daily traffic count still falls within the likely capacity for maintained paved roads within and outside the MBPA.

Based on the factors discussed in **Section 4.12.1.1.2**, the No Action Alternative would generate approximately 233 trips per day upon completion of well development. However, as with the Proposed Action, this calculation assumes one well per well pad, and most of these trips would be made by relatively few vehicles. Impacts on U.S. 40/U.S. 191 would be similar to those described under the Proposed Action, but would be less due to lower traffic volume. As noted in the Proposed Action discussion, UDOT indicated that a paved, two-lane rural county road would likely accommodate traffic that would be generated as a result of the No Action Alternative. It is not known if a maintained gravel road could handle additional vehicle trips, but given the smaller volume than the Proposed Action, such roads would be more likely to accommodate traffic under this alternative. The total amount of vehicle miles traveled during well operations under the No Action Alternative would be 5.2 vehicle miles per well multiplied by the number of wells, or approximately 4,046 total vehicle miles per day.

An increase in traffic within the MBPA and the surrounding transportation network would be evident during the LOP. Based on information provided in **Section 4.12.1.1.2**, Alternative B could result in as many as 16 accidents annually, once all of the wells have been drilled and are in operation. The majority of these accidents would be minor.

Newfield would implement ACEPMs detailed in **Section 2.2.12** and the Reclamation Plan (**Appendix G**). Newfield would also implement additional actions to minimize transportation impacts (see **Section 4.12.1.1.2**).

4.12.1.3 Alternative C - Field-wide Electrification

4.12.1.3.1 Land Use

Under Alternative C, construction of up to 5,750 wells and associated pads, access roads, pipelines, transmission and distribution lines, and other and facilities would result in the initial disturbance of approximately 19,344 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 9,748 acres (see **Table 2.5-1**). Approximately 86 percent of the proposed initial surface disturbance would occur on BLM-administered lands. Of the remaining initial disturbance area, approximately 11 percent would occur on state lands and about 3 percent would occur on private lands (see **Table 4.12-1**). Approximately 6.5 acres of tribal land would be initially disturbed.

As described in **Section 3.12**, oil and natural gas exploration and development is a primary land use within the MBPA. Infill development under Alternative C would have similar impacts to the Proposed Action in terms of increased activities in the MBPA and contribution to the general semi-industrial setting. Construction of additional pipelines and increased traffic on roads co-located with pipelines also would have similar impacts to the Proposed Action. However, because nearly all existing ROWs in the MBPA would be used for ongoing well field operations, and all proposed pipelines would be buried, minimal adverse impacts to existing ROWs would occur. In addition, increased traffic would increase the risk of vehicle accidents that could result in damage or rupture to surface pipelines adjacent to roads. However, because nearly all existing ROWs in the MBPA are used for ongoing well field operations, and because all proposed pipelines would be buried, minimal adverse impacts to existing ROWs would occur. As with the Proposed Action, any potential conflicts with existing ROWs could be resolved on a site-specific basis. Mitigation measures addressing potential impacts to transportation, range resources, fish and wildlife, and recreation are detailed in their respective sections of **Chapter 4.0**, as appropriate. Potential impacts to other land uses under Alternative C would be similar to those described under the Proposed Action. (See **Section 4.12.1.1.1.**)

4.12.1.3.2 Transportation

Under Alternative C, new roads would be constructed as needed to provide access to the proposed new wells. In addition to the approximately 363 miles of roads already in place to service existing facilities, an estimated 243 miles of new roads would be necessary to access the new wells developed under this alternative.

Transportation resources would be impacted through additional vehicle trip generation. These would be greatest during the well drilling and completion phases of the project. The projected maximum daily increase in trips per day for Alternative C would be the same as what would be expected under the Proposed Action (i.e., approximately 35 total trips per day per well during peak well completion). When this number is added to the existing traffic counts, the resulting new potential average daily traffic count still falls within the likely capacity for maintained paved roads within and outside the MBPA.

Based on the factors discussed in **Section 4.12.1.1.2**, Alternative C would generate approximately 1,725 trips per day upon completion of well development – the same number as the Proposed Action. This calculation assumes one well per well pad, and most of these trips would be made by relatively few vehicles. Impacts on U.S. 40/U.S. 191 would be the same as those described under the Proposed Action. As noted in the Proposed Action discussion, UDOT indicated that a paved, two-lane rural county road would likely accommodate traffic that would be generated as a result of Alternative C. It is not known if a maintained gravel road could handle additional vehicle trips under this alternative. The total amount of vehicle miles traveled during well operations under Alternative C would be the same as the Proposed Action, or approximately 29,900 total vehicle miles per day.

An increase in traffic within the MBPA and the surrounding transportation network would be evident during the LOP. Based on information provided in **Section 4.12.1.1.2**, Alternative C could result in as many as 115 accidents annually – the same number as the Proposed Action. The majority of these accidents would be minor.

Newfield would implement ACEPMs detailed in **Section 2.2.12** and the Reclamation Plan (**Appendix G**). Newfield would also implement additional actions to minimize transportation impacts. (See **Section 4.12.1.1.2.**)

4.12.1.4 Alternative D - Agency Preferred Alternative

4.12.1.4.1 Land Use

Under Alternative D, construction of up to 5,750 wells and associated pads, access roads, pipelines, and facilities would result in the initial disturbance of approximately 9,968 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 4,807 acres (see **Table 2.6-1**). Approximately 87 percent of the proposed initial surface disturbance would occur on BLM-administered Federal lands. Of the remaining initial disturbance, approximately 11 percent would occur on State lands, and about 2 percent would occur on private lands (see **Table 4.12-1**). Approximately 1.7 acres of tribal land would be initially disturbed.

As described in **Section 3.12**, oil and natural gas exploration and development is a primary land use within the MBPA. Infill development under Alternative D would have similar impacts to the Proposed Action in terms of increased activities in the MBPA and contribution to the general semi-industrial setting. Construction of additional pipelines and increased traffic on roads co-located with pipelines may potentially impact the integrity of existing ROWs within the MBPA. In addition, increased traffic would increase the risk of vehicle accidents that could result in damage or rupture to surface pipelines adjacent to roads. However, because nearly all existing ROWs in the MBPA are used for ongoing well field operations, and because all proposed pipelines would be buried, minimal adverse impacts to existing ROWs would occur. As with the Proposed Action, any potential conflicts with existing ROWs could be resolved on a site-specific basis. Mitigation measures addressing potential impacts to transportation, range resources, fish and wildlife, and recreation are detailed in their respective sections of **Chapter 4.0**, as appropriate. Potential impacts to other land uses under Alternative D would be similar to those identified for the Proposed Action (see **Section 4.12.1.1.1**).

4.12.1.4.2 Transportation

Under Alternative D, new roads would be constructed as needed to provide access to the proposed new wells. In addition to the approximately 318 miles of roads already in place to service existing facilities, an estimated 226 miles of new roads would be necessary to access the new wells developed under this alternative.

Transportation resources would be impacted through additional vehicle trip generation. These would be greatest during the well drilling and completion phases of the project. The projected maximum daily increase in trips per day for Alternative D would be the same as the Proposed Action (i.e., approximately 35 total trips per day per well during peak well completion). When this number is added to the existing traffic counts, the resulting new potential average daily traffic count still falls within the likely capacity for maintained paved roads within and outside the MBPA.

Based on the factors discussed in **Section 4.12.1.1.2**, Alternative D would generate approximately 1,517 trips per day upon completion of well development. This calculation assumes one well per well pad, and most of these trips would be made by relatively few vehicles. Impacts on U.S. 40/U.S. 191 would be similar to those described under the Proposed Action, but would be less due to slightly lower traffic volume. As noted in the Proposed Action discussion, UDOT indicated that a paved, two-lane rural county road would likely accommodate traffic that would be generated as a result of Alternative D. It is not known if a maintained gravel road could handle additional vehicle trips under this alternative. The total amount of vehicle miles traveled during well operations under Alternative D would be 5.2 vehicle miles per well multiplied by the number of wells, or approximately 26,302 total vehicle miles per day.

An increase in traffic within the MBPA and the surrounding transportation network would be evident during the LOP. Based on information provided in **Section 4.12.1.1.2**, Alternative D could result in as many as 101 accidents annually, once all of the wells have been drilled and are in operation. The majority of these accidents would be minor.

Newfield would implement ACEPMs detailed in **Section 2.2.12** and the Reclamation Plan (**Appendix G**). Newfield would also implement additional actions to minimize transportation impacts. (See **Section 4.12.1.1.2.**)

4.12.2 Mitigation

4.12.2.1 Transportation Mitigation

The following proposed mitigation measures could be applied to reduce impacts to transportation-related activities:

- Newfield employees and contractors would comply with posted speed limits while driving roads within the MBPA and would adhere to speed limits outside the MBPA.
- Additional permanent and temporary signage would be placed along roadsides to alert motorists of upcoming construction vehicles to lower the probability of accidents.
- Newfield would coordinate with the appropriate AO when constructing, maintaining, or reclaiming roads.
- Cooperative road management plans would be developed among Newfield, Duchesne County, Uintah County, the State of Utah, and private landowners to address maintenance requirements and responsibilities, and to ensure that roads used by project vehicles are not degraded.
- Whenever practicable, heavy and/or slow-moving equipment would be moved at night or during non-peak driving times to minimize delays to other users. Flaggers and/or flag cars would be used to alert non-project traffic to upcoming project equipment.
- Gas and water pipelines would be buried at road crossings. Newfield would bury all pipelines crossing County roads to a minimum depth of 5 feet to ensure the safety of road maintenance workers and activities.
- Signs would be installed in areas of heavy equipment and truck traffic to warn other users.
- Passing areas would be constructed as directed by the AO so other users can safely pass project-related vehicles.
- Newfield would use centralized tank locations for water and condensate tanks to reduce vehicle trips whenever possible. The feasibility of centralizing tank facilities would be determined on a site-specific basis.
- All applicable Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.

4.12.3 Unavoidable Adverse Impacts

There are no unavoidable adverse impacts related to land use. Increased vehicular traffic would increase local traffic volumes, elevate the risk of traffic accidents, add to the local requirements for road maintenance, and cause occasional delays for non-project users. Although the risk of traffic accidents, delays, and the need for increased road maintenance could be mitigated, there would still be some residual impacts. This would occur under all of the alternatives to varying degrees, depending on the number of miles of new access road and on estimated vehicle trips during construction and operations.

4.12.4 Irretrievable and Irreversible Commitments of Resources

Surface disturbance generated by the project would remain in that state until rehabilitated (approximately 30 years after drilling), as described elsewhere in this chapter. Any traffic accidents caused by project-related activities would be irreversible.

4.12.5 Relationship of Short-Term Uses to Long-Term Productivity

This project is unlikely to impact long-term land use, land ownership, or land management. Many of the aboveground facilities, such as drill rigs and water tanks, eventually would be removed at the end of their relatively short-term life spans, and the land would be reclaimed to natural conditions. The reclamation of arid desert lands can take several decades, but reclamation would reduce the long-term impacts to public land resources.

The increased road network required for the project would lead to increased access over the LOP, or until project roads were decommissioned. Although increased traffic volume from drilling and construction would occur, it would be a short-term and localized effect. Traffic volume increases during production would be less than during the combined well drilling and production phase, but would persist for the LOP.

4.13 RECREATION

The potential effects of the construction and operation of the Proposed Action on recreational resources are determined based on an analysis of how many recreational opportunities would be lost versus how many would be created. Direct impacts to recreation would occur if acreage that is currently available for recreation were used for well exploration and development, or if additional recreational opportunities are created by an expanded road network and project-related surface disturbances.

The facilities and structures proposed under the Proposed Action and the other alternatives would likely impact recreational opportunities by directly disrupting current activities such as hunting, OHV use where allowed, wetlands recreation, and hiking. Additionally, impacts to river recreationists would include visual and noise impacts associated with drilling a water well in or drilling oil and gas wells near the Green River floodplain. Specific impacts are discussed below in the analysis of river recreation. Construction and operation of proposed facilities could also create a visual intrusion on the recreational experience (e.g., enjoyment and appreciation) sought by recreationists who value unobstructed viewsheds and relatively natural settings for their activities (BLM 2005b, BLM 2006a).

Potential direct impacts associated with the Proposed Action would include artificial light and related light pollution (e.g., sky glow) from night lighting required for night-time drilling. Night lighting would degrade scenic quality by contributing to the intrusive artificial lighting of oil and gas operations. This would be of particular concern in the Green River areas. Compliance with the provisions from the Gold Book described in the previous paragraph would reduce potential adverse impacts from lighting at well drilling sites.

The types of direct and indirect effects on recreation resources would be the same under all alternatives, because they would use the same well drilling and production methods. However, project-related impacts would vary in degree, based on the number of wells and associated roads, pipelines, and other proposed facilities.

As described in **Section 3.13.1**, the BLM manages recreational use of public lands through two different basic units of recreation management: the SRMA and the ERMA. No SRMAs exist within the MBPA, so no impacts on these units would occur. The public lands within the MBPA are managed as an ERMA, wherein recreation activities are subject to few restrictions and are managed at the opportunity level, rather than for specific activities and experiences. **Table 4.13-1** compares the acres that would be disturbed by each alternative.

TABLE 4.13-1
LONG-TERM DISTURBANCE FROM WELL PADS AND NEW ROADS BY ALTERNATIVE

	Alternative A – Proposed Action	Alternative B – No Action	Alternative C – Field-wide Electrification	Alternative D – Agency Preferred Alternative
Acres of Disturbance from Well Pads	7,527	617	9,748	4,807
Miles of New Roads	243	23	243	226

4.13.1 Direct and Indirect Effects

4.13.1.1 Alternative A - Proposed Action

4.13.1.1.1 Short-Term Recreational Impacts

Short-term impacts to recreation within the MBPA as a result of the Proposed Action would occur from project-related construction, operation, and maintenance activities. These development activities would result in additional disruption to recreation as a result of increased noise (e.g., increased volumes from construction, drilling, and production equipment, changes in ambient tones or tonal noises, and repetitive low frequency noise emanating from production equipment such as compressor stations), dust, traffic, visual intrusions, and increased industrial presence. See **Sections 4.12 and 4.14** regarding impacts to access and visual resources, respectively. It is likely that recreational travel through the well field will increase over time. In addition, development of new project-related roads would result in increased access for, and a wider distribution of, OHV usage.

The Proposed Action would add to hundreds of existing oil wells with associated pump jacks that are located within viewing distance of recreational users driving these roads. Previously authorized oil and gas operations have added an industrial component to the landscape throughout the majority of the MBPA, and the Proposed Action would add to this type of landscape.

The Proposed Action would potentially create more opportunities for OHV recreation with 243 more miles of project-related access roads. Construction of access roads would increase opportunities for motorized forms of recreation such as backcountry driving and sightseeing. Existing well field development has not restricted public access for dispersed recreation along Pariette Road leading to Pariette Wetlands, Sand Wash Road leading to Green River recreation access, or Wells Draw Road leading to recreational opportunities throughout the well field. Energy development has made revenue available to Uintah and Duchesne Counties enabling them to improve the Pariette and Wells Draw roads, which has greatly increased the accessibility and safety of travel to recreational opportunities in the area. The Proposed Action would further provide revenue to the counties, which could be used to improve the accessibility to recreation areas.

4.13.1.1.2 Long-Term Recreational Impacts

Under the Proposed Action, the potential long-term adverse effects on recreation would include a decrease in some recreational opportunities due to the direct conversion of 7,527 acres of land to well-drilling facilities. The potential long-term beneficial effects on recreation under the Proposed Action would include increased recreational opportunities through access to previously inaccessible areas made possible by 243 miles of new roads. New access would provide benefits to some types of recreationists; specifically, motorized and mechanized users would receive the greatest benefits.

River Recreation

Impacts to river recreation would include visual impacts associated with wells within sight of the Green River. **Section 4.15.1.1.1** discusses potential impacts to the area within the Lower Green River ACEC and the suitable WSR segment.

Project-related construction, operation, and maintenance activities would occur more than 9 miles north of the Sand Wash put-in, which provides the main access point to the Green River in the vicinity. As no wells would be drilled within 9 miles of the Sand Wash put-in, no impacts are expected for this resource. Visual impacts experienced on the stretch of the Green River to north of the Sand Wash put-in would not affect as many visitors, because recreational use is lower on that WSR segment.

Development would not be visible to river recreationists within the Green River, due to obstruction of line of sight between and well development. As presented in **Section 3.1**, General Setting, the elevation within the MBPA varies up to approximately 2,236 feet. A steep topographic gradient (several hundred feet in places) is frequently present between the surface water level of the Green River and the surrounding upland landforms. The presence of vegetation, both on stream banks as well as upland areas, further obstructs the recreationist's view. For these reasons, the well development located nearest to the river corridor would be most visible to recreationists, while that development furthest from the river corridor would be least visible.

The water collector well would be drilled with a workover rig, which is smaller than drilling rigs used for oil and gas wells. In addition, the collector well would only be drilled during daylight hours. Construction of the proposed collector well would have limited impacts on recreational users, as the well would be drilled in the fall or winter, during a period of low recreational use. Once completed, the collector well would not be visible from the river. In addition, ACEPMs detailed in **Section 2.2.12.9** would reduce visual impacts to recreationists on the Green River by using low-profile tanks at all well pads located within one-half mile or line of sight of the Green River, whichever is less.

Hunting

Big-game hunters may receive a direct benefit from well development in the MBPA from the 243 miles of new roads that would be created under the Proposed Action (see **Table 4.13-1**). The expanded road network may increase access to potential hunting areas within the MBPA. However, this direct benefit may only be experienced by a small percentage of hunters and could be outweighed by the long-term direct and indirect adverse effects of habitat reduction, lower forage productivity, noise, and persistent human presence.

Well development in the MBPA would have long-term indirect adverse effects related to elk, deer, and pronghorn populations and behavior. **Section 4.9.1.1** contains a more detailed discussion of the impacts on elk, deer, and other wildlife species. Roads have been shown to reduce habitat value for elk and deer, thereby decreasing the likelihood of hunters finding elk and deer in areas with new roads. Habitat conversion and fragmentation due to the construction of wells would also indirectly impact big-game hunting, because the elk and deer would have fewer resources for cover, forage, and breeding grounds. Constructing a network of new roads would also result in noise and a persistent human presence, which would negatively affect wildlife populations and use of the area. Increased road mileage would detract from the experience of hunters who value hunting in a natural setting removed from motorized sights and sounds.

Small-game hunting also occurs across the MBPA. Small-game hunters would experience similar impacts from well development as big-game hunters, including loss of cover and breeding areas for game species, as well as loss of hunting grounds due to the direct conversion of vegetated land to gas wells and roads. While some small-game species such as sage-grouse are likely to avoid developed areas, others such as cottontail are frequently found around well facilities (BLM 2006d). Consequently, the impacts of project construction to small-game hunters are likely to depend on which species is being hunted. The construction of additional roads throughout small-game hunting habitats would increase access for hunters, potentially increasing their success rates depending on the species hunted.

Direct impacts to waterfowl hunting could result from increased levels of human activity and noise in close proximity to potential waterfowl habitat. Increased noise levels and visual obstructions from construction and drilling activities would be localized and short-term; therefore, indirect impacts to waterfowl hunters would likely be temporary in nature and would not likely alter the use of specific waterfowl hunting areas or productivity of current waterfowl populations. Direct impacts to waterfowl hunters are expected to be minor, as very little disturbance to wetland habitats are expected to occur under the Proposed Action and because of implementation of the conservation measures listed in **Section 4.10.2**.

The Proposed Action may provide a limited beneficial impact from increased access to hunting areas as a result of additional access road construction. However, there would be adverse, long-term impacts from the Proposed Action from habitat fragmentation and habitat conversion due to the number of acres impacted by well pad and access road construction.

OHV Recreation

Well development in the MBPA would result in direct long-term adverse impacts to OHV users through the alteration of developed lands. Areas that are currently designated as Limited Use would be altered by the construction of well pads and pipelines. OHV use within the MBPA would be limited to existing roads and trails. Approximately 6,459 acres of BLM land within the MBPA, which is all designated as Limited Use, would be converted to project facilities in the long term. However, ACEPMs detailed in **Section 2.2.12.4** would reduce the impacts of buried pipelines for site-specific use on OHV travel.

OHV users would gain direct, long-term beneficial recreational opportunities with the addition of 243 miles of access roads within areas designated as Limited Use.

Wetlands Recreation

If the Proposed Action were implemented, up to approximately 1,209 acres would be initially disturbed in the Pariette Wetlands ACEC. Approximately 439 acres within the ACEC would be disturbed and potentially unavailable for recreation in the long term due to well development (see **Section 4.15.1.1.1**). No disturbance to the trail or parking lot of the Pariette Wetlands ACEC is anticipated. Users of the ACEC would experience higher traffic to and from the trail and parking lot as a result of increased project related traffic within the MBPA. Mitigation measures for impacts to wetland and riparian areas are discussed in **Section 4.7.3**. In addition to surface disturbance, wells in this area could adversely and indirectly impact visitor recreational satisfaction by disturbing waterfowl.

Hiking

As noted in **Section 3.13.2.6**, few people use the MBPA for hiking because there are relatively few attractions for hikers. As such, there would be relatively minor adverse impacts to this recreation user group from well development. As noted in the Wetlands Recreation subsection above, no disturbance to the trail or parking lot of the Pariette Wetlands ACEC is anticipated. The BLM is proposing to improve the existing trail system at the Pariette Wetlands ACEC by constructing a connecting trail between the parking lot and existing trails and elevated walkways to create a loop trail. Since disturbance to the existing trail and parking lot is not anticipated, the Proposed Action is not anticipated to disturb the proposed improvements. ACEPMs detailed in **Sections 2.2.12.4** and **2.2.12.9** would reduce the visual impacts and the potential impacts to the recreational experience.

4.13.1.2 Alternative B - No Action Alternative

4.13.1.2.1 Short-Term Recreational Impacts

Short-term impacts to recreation within the MBPA as a result of Alternative B would occur from project-related construction, operation, and maintenance activities. The impacts of these development activities would be similar to those discussed under the Proposed Action, although they would be less extensive due to the fewer number of wells that would be drilled and operated. It is likely that recreational travel through the well field would increase over time. In addition, development of new project-related roads would result in increased access for, and a wider distribution of, OHV usage. However, due to less development occurring under Alternative B, the extent of these impacts would be less than what would occur under the Proposed Action.

Alternative B would add to hundreds of existing oil wells with associated pump jacks that are located within viewing distance of recreational users driving these roads. Compared to the other alternatives, the No Action Alternative would have fewer potentially adverse impacts on recreational opportunities because fewer wells would be developed and fewer acres would be impacted by well pad construction. Nevertheless, Alternative B would add to the industrial component of the landscape contributed as a result of previously authorized oil and gas operations.

Like the Proposed Action, Alternative B would potentially create more opportunities for OHV recreation and other motorized forms of recreation with 23 miles of new project-related access roads. These opportunities would be less extensive than under the Proposed Action or other alternatives, due to the smaller number of miles of new roads. Alternative B would not restrict public access to dispersed recreation along Pariette Road, Sand Wash Road, or Wells Draw Road.

4.13.1.2.2 Long-Term Recreational Impacts

Under Alternative B, the potential long-term adverse effects on recreation would include a decrease in recreational opportunities due to the direct conversion of 617 acres of land to well-drilling facilities. (See **Table 4.13-1.)** The potential long-term beneficial effects would include increased recreational opportunities through access to previously inaccessible areas made possible by 23 miles of new roads. As with the Proposed Action, new access would provide benefits to some types of recreationists, particularly motorized and mechanized users.

River Recreation

Impacts to river recreation would include visual impacts associated with wells within sight of the Green River. **Section 4.15.1.2.1** discusses potential impacts to the area within the Lower Green River ACEC and the proposed WSR segment. As with the Proposed Action, the No Action Alternative would drill no wells within approximately 9 miles of the Sand Wash put-in, so visual impacts at this entry to the Green River would be minor. Visual impacts experienced on the stretch of the Green River to north of the Sand Wash put-in would be similar to those discussed under the Proposed Action.

Only a small portion of the MBPA, just south of the confluence with Pariette Wash, would be adjacent to the Green River. Under the No Action Alternative, there would be no surface disturbance within one mile of the river. River recreation users on this segment would quickly move away from any sights and sounds of development. Given the lower number of wells that would be drilled under the No Action Alternative, few if any wells would be drilled in the vicinity of the Green River. In addition, ACEPMs detailed in **Section 2.2.12.9** would reduce visual impacts to recreationists on the Green River.

Hunting

Under Alternative B, both big-game hunters and small-game hunters may receive a direct benefit from added roads, but may also experience adverse effects similar to those described under the Proposed Action. Compared to the other alternatives, Alternative B would have less of a beneficial impact from increased access to hunting areas, because fewer new roads would be constructed. Impacts to waterfowl hunting would be less than those described under the Proposed Action, as less surface disturbance would occur within or around wetland areas. However, there would be fewer adverse long-term impacts from increased habitat fragmentation and habitat conversion under Alternative B, because fewer acres would be impacted by well pad and access road construction.

OHV Recreation

Well development under Alternative B would result in similar long-term adverse impacts to, and create similar long-term beneficial recreational opportunities for, OHV users as under the Proposed Action. However, the amount of Limited Use land converted to developed uses would be less under this alternative; therefore, less acreage currently available to OHV users would be lost. OHV use within the MBPA would be limited to existing roads and trails. Approximately 74 acres of BLM land within the MBPA, which are all designated as Limited Use, would be converted to project facilities in the long term. ACEPMs detailed in **Section 2.2.12.4** would reduce the impacts of buried pipelines for site-specific use on OHV travel. Any new well activity in areas currently designated as closed to OHV use would not impact OHV users. OHV users would gain direct, long-term beneficial recreational opportunities with the addition of 23 miles of access roads within areas designated as Limited Use.

Wetlands Recreation

If Alternative B were implemented, up to approximately 62 acres would be initially disturbed in the Pariette Wetlands ACEC. Approximately 45 acres within the ACEC would be disturbed and potentially unavailable for recreation in the long term due to well development (see **Section 4.15.1.2.1**). No disturbance to the trail or parking lot of the Pariette Wetlands ACEC is anticipated. Users of the ACEC would experience higher traffic to and from the trail and parking lot as a result of increased project related traffic within the MBPA. Mitigation measures for impacts to wetland and riparian areas are discussed in **Section 4.7.3**. In addition to surface disturbance, wells in this area could adversely and indirectly impact visitor recreational satisfaction by disturbing waterfowl. Compared to the Proposed Action, the No Action Alternative would have fewer long-term adverse impacts to wetlands recreation, because less wetland/riparian area would be disturbed.

Hiking

As noted in **Section 3.13.1**, few people use the MBPA for hiking because there are relatively few attractions for hikers. As such, there would be relatively minor adverse impacts to this recreation user group from well development. Under Alternative B, there would be fewer impacts related to hiking than under the other alternatives. No disturbance to the existing trail or parking lot of the Pariette Wetlands ACEC, or to proposed improvements, is anticipated. As noted in the Proposed Action section, ACEPMs detailed in **Sections 2.2.12.4** and **2.2.12.9** would reduce the visual impacts and the potential impacts to the recreational experience.

4.13.1.3 Alternative C – Field-wide Electrification

4.13.1.3.1 Short-Term Recreational Impacts

Short-term impacts to recreation within the MBPA as a result of Alternative C would occur from project-related construction, operation, and maintenance activities. These impacts would be similar in scope and magnitude to those discussed under the Proposed Action, because the number of wells drilled under Alternative C would be the same. Furthermore, the potential to create opportunities for OHV and other motorized forms of recreation would also be identical under Alternative C, because the same miles of new roads would be required. The primary difference in impacts to recreation under Alternative C when compared to the Proposed Action is the addition of field-wide electrification, which would result in additional visual impacts and intrusions in the MBPA and could further diminish the recreational experience for visitors to the MBPA.

4.13.1.3.2 Long-Term Recreational Impacts

Under Alternative C, the potential long-term adverse effects on recreation would include a decrease in some recreational opportunities due to the direct conversion of 9,748 acres of land to well-drilling facilities (see **Table 4.13-1)**. The potential long-term beneficial effects on recreation would be similar to those under the Proposed Action, including increased recreational opportunities through access to previously inaccessible areas made possible by 243 miles of new roads.

River Recreation

Impacts to river recreation would include visual impacts associated with wells within sight of the Green River. **Section 4.15.1.3.1** discusses potential impacts to the area within the Lower Green River ACEC and the proposed WSR segment. As with the Proposed Action, Alternative C would drill no wells within approximately 9 miles of the Sand Wash put-in, so visual impacts at this entry to the Green River would be minor. Visual impacts experienced on the stretch of the Green River to north of the Sand Wash put-in would be similar to those discussed under the Proposed Action. However, any overhead utility lines visible from the river would further diminish the river recreation experience, as compared to the Proposed Action.

Only a small portion of the Project Area, just south of the confluence with Pariette Wash, would be adjacent to the Green River. Under Alternative C, the number of acres of surface disturbance within one mile of the river would be the same as what would be expected under the Proposed Action. Potential impacts would be the same as those described under the Proposed Action. ACEPMs detailed in **Section 2.2.12.9** would reduce visual impacts to recreationists on the Green River.

Hunting

Under Alternative C, big-game hunters, waterfowl hunters, and small-game hunters may receive the same direct benefit of road access, but may also experience the same adverse effects as those described under the Proposed Action. Impacts to waterfowl hunting would be identical to those described under the Proposed Action, as a similar amount of surface disturbance would occur within or around wetland areas. Both the number of wells drilled and the 243 miles of new roads planned under Alternative C would be the same as under the Proposed Action. The expanded road network may increase access to potential hunting areas within the MBPA.

OHV Recreation

Well development under Alternative C would result in similar direct long-term adverse impacts to OHV users and the same long-term beneficial impacts on OHV recreational opportunities as those expected under the Proposed Action. However, the amount of Limited Use land converted to developed uses would be greater under this alternative; therefore, more acreage currently available to OHV users would be lost. Approximately 8,368 acres of BLM land within the MBPA, which are all designated as Limited Use, would be converted to project facilities in the long term. OHV use within the MBPA would be limited to existing roads and trails. The ACEPMs detailed in **Section 2.2.12.4** would reduce the impacts of buried pipelines for site-specific use on OHV travel.

OHV users would gain direct, long-term beneficial recreational opportunities with the addition of 243 miles of access roads within areas designated as Limited Use.

Wetlands Recreation

If Alternative C were implemented, up to approximately 1,244 acres would be initially disturbed in the Pariette Wetlands ACEC. Approximately 612 acres within the ACEC would be disturbed and potentially unavailable for recreation in the long term due to well development (see **Section 4.15.1.3.1**). No disturbance to the trail or parking lot of the Pariette Wetlands ACEC is anticipated. Users of the ACEC would experience higher traffic to and from the trail and parking lot as a result of increased project related traffic within the MBPA. Mitigation measures for impacts to wetland and riparian areas are discussed in **Section 4.7.3**. Compared to the Proposed Action, Alternative C would have similar long-term adverse impacts to wetlands recreation, because about the same amount of wetland/riparian area would be would be disturbed. In addition, overhead utility lines visible to recreational users in the ACEC could diminish the experience of such visitors.

Hiking

As with the Proposed Action, Alternative C would have relatively minor adverse impacts of well development on this recreation user group. No disturbance to the existing trail or parking lot of the Pariette Wetlands ACEC, or to proposed improvements, is anticipated. However, overhead utility lines could diminish the experience of hikers. As noted in the Proposed Action section, ACEPMs detailed in **Sections 2.2.12.4** and **2.2.12.9** would reduce the visual impacts and the potential impacts to the recreational experience.

4.13.1.4 Alternative D - Agency Preferred Alternative

4.13.1.4.1 Short-Term Recreational Impacts

Short-term impacts to recreation within the MBPA as a result of Alternative D would occur from project-related construction, operation, and maintenance activities. These impacts would be similar to those discussed under the Proposed Action, but would be less extensive because the number of acres that would be disturbed would be less under Alternative D. Furthermore, the potential to create opportunities for OHV and other motorized forms of recreation would also be similar to the Proposed Action, but would be less extensive because fewer miles of new roads would be required.

4.13.1.4.2 Long-Term Recreational Impacts

Under Alternative D, the potential long-term adverse effects on recreation would include a decrease in recreational opportunities due to the direct conversion of 4,807 acres of land to well-drilling facilities (see **Table 4.13-1**). The potential long-term beneficial effects on recreation would include increased recreational opportunities through access to previously inaccessible areas resulting from 226 miles of new roads. The potential adverse effects and benefits under Alternative D would be similar to those discussed under the Proposed Action, but would be less extensive because fewer acres would be disturbed.

River Recreation

Impacts to river recreation would include visual impacts associated with wells within sight of the Green River. Under Alternative D, two proposed well pads with 160-acre spacing would be directionally drilled in ACEC, two proposed Green River well pads with 160-acre spacing would be expanded, and one existing well pad would be expanded and directionally drill in ACEC could be placed within 0.5 mile sight of the river. **Section 4.15.1.4.1** discusses potential impacts to the area within the Lower Green River ACEC and proposed WSR segment. As with the Proposed Action, Alternative D would drill no wells within approximately 9 miles of the Sand Wash put-in, so visual impacts at this entry to the Green River would be minor. Visual impacts experienced on the stretch of the Green River to north of the Sand Wash put-in would be similar to those discussed under the Proposed Action.

Only a small portion of the MBPA, just south of the confluence with Pariette Wash, would be adjacent to the Green River. Potential impacts would be the same as those described under the Proposed Action, but would be less extensive due to the smaller number of acres that would be disturbed. ACEPMs detailed in **Section 2.2.12.9** would reduce visual impacts to recreationists on the Green River.

Hunting

Under Alternative D, big-game hunters, waterfowl hunters, and small-game hunters may receive the same direct benefit of road access, but may also experience adverse effects similar to those described under the Proposed Action. However, Alternative D would have less of a beneficial impact from increased access to hunting areas than the Proposed Action, because fewer new roads would be constructed. On the other hand, there would be fewer adverse long-term impacts from increased habitat fragmentation and habitat conversion under Alternative D because fewer acres would be impacted by well pad and access road construction. Impacts to waterfowl hunting would be less than those described under the Proposed Action, as no surface disturbance would occur within or around wetland areas within the Pariette Wetlands ACEC.

OHV Recreation

Well development under Alternative D in the MBPA would result in similar, direct long-term adverse impacts to, and create similar long-term beneficial recreational opportunities for, OHV users as described under the Proposed Action. OHV use within the MBPA would be limited to existing roads and trails Approximately 4,170 acres of BLM land within the MBPA, which are all designated as Limited Use, would be converted to well pads and other project facilities in the long term. ACEPMs detailed in **Section 2.2.12.4** would reduce the impacts of buried pipelines for site-specific use on OHV travel. OHV users would gain direct, long-term beneficial recreational opportunities with the addition of 226 miles of access roads within areas designated as Limited Use.

Wetlands Recreation

If Alternative D were implemented, up to approximately 447 acres could potentially be disturbed in the Pariette Wetlands ACEC. Approximately 206 acres within the ACEC would be disturbed and potentially unavailable for recreation in the long term due to well development (see **Section 4.15.1.4.1**). However, it is important to recognize that is a worst-case estimate, as one of the key goals of Alternative D is to reduce surface disturbance in the ACEC. For example, under Alternative D, development would focus on the expansion of existing well pads in the ACEC, rather than new well pads. No disturbance to the trail or parking lot of the Pariette Wetlands ACEC is anticipated. Users of the ACEC would experience higher traffic to and from the trail and parking lot as a result of increased project related traffic within the MBPA above background levels. Mitigation measures for impacts to wetland and riparian areas are discussed in **Section 4.7.3**. Compared to the Proposed Action, Alternative D would have no direct long-term adverse impacts to wetlands recreation because no wetland habitat would be disturbed.

Hiking

As noted in **Section 3.13.1**, few people use the MBPA for hiking because there are relatively few attractions for hikers. As such, there would be relatively minor adverse impacts to this recreation user group from well development. Under Alternative D, there would be fewer impacts related to hiking than under the Proposed Action. No disturbance to the existing trail or parking lot of the Pariette Wetlands ACEC, or to proposed improvements, is anticipated. As noted in the Proposed Action section, ACEPMs detailed in **Sections 2.2.12.4** and **2.2.12.9** would reduce the visual impacts and the potential impacts to the recreational experience.

4.13.2 Mitigation

In addition to the unique design features of the alternative and the ACEPMs detailed in **Section 2.2.12**, the following proposed mitigation measures could be applied to reduce impacts to recreational resources:

- Low-profile tanks would be used to reduce visual impacts to recreationists at the direction of the AO.
- Newfield would use offsite tanks or centralized tank batteries at production locations to reduce visual impacts to recreationists whenever possible. The feasibility of using offsite tanks or centralized tank batteries would be determined on a site-specific basis.
- Newfield and the AO would perform the following actions during APD processing when feasible:
    - Jointly determine the use of topographic features to serve as visual screens
    - Place facilities away from highly visible points such as ridgelines

  - Use low-profile tanks to reduce visibility where taller tanks would be more visible
  - Use noise-reducing technology to reduce noise levels experienced by river recreationists to "quiet" levels
  - Avoid excessive side-casting of earth materials from ridgelines and steep slopes
- No wells, roads, or other surface disturbance would be allowed on the Pariette Wetlands trail or parking lot.
- Except for the proposed water collector well, no surface-disturbing activities would occur within 0.5 miles or line of sight of the river.
- The proposed water collector well would be screened from the viewshed of the river as much as possible.

4.13.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts to recreational resources include the long-term loss of primitive, dispersed, and unconfined recreational opportunities from surface-disturbing activities, increased vehicle traffic, and adverse visual and noise impacts. Other unavoidable adverse impacts apply to specific groups of recreationists such as hunters, who would be impacted indirectly by direct impacts to big-game herds and game habitat fragmentation in the area. In areas of concentrated development, change in natural settings would be an unavoidable long-term adverse impact to recreational resources, including visual impacts to river recreationists along the Green River under the Proposed Action and Alternatives C and D.

4.13.4 Irretrievable and Irreversible Commitments of Resources

No irretrievable impacts to recreation are anticipated as a result of this project. Irreversible impacts to recreational resources would include the alteration of natural settings where long-term development (i.e., roads) occurs and cannot be reclaimed due to continued use.

4.13.5 Relationship of Short-Term Uses to Long-Term Productivity

Hunting and dispersed camping opportunities would be impaired by the short-term use of the MBPA for well development. However, project development would not impact long-term productivity of recreational resources, because reclamation would restore the recreational values of the land and hunting opportunities. While permanent project-related roads would alter the suitability of these areas for non-motorized recreation use, they would provide continued access to recreational opportunities for others, such as OHV users and hunters.

4.14 VISUAL RESOURCES

This section of the EIS describes the potential impacts of oil and gas infill development to visual resources within the MBPA. Short-term impacts are those that would affect visual resources for fewer than 5 years, and long-term impacts would affect visual resources for more than 5 years (BLM 1986). As described in **Section 3.14.1**, the MBPA is moderately developed with oil and natural gas wells, and the general feel of the area is semi-industrial. Existing access roads, pump jacks, storage tanks, and aboveground pipelines are a prominent part of the viewscape. The potential adverse impacts to visual resources would include the added human-made form, color, and linear contrasts to the natural landscape created by construction equipment, pipelines, well pads, access roads, and other forms of infrastructure associated with infill development. Invasive weeds resulting from project-related activities and increased road in the MBPA can also adversely affect the visual character of an area.

As described in **Section 3.14.2**, the BLM's VRM system is used to inventory and then designate VRM classes to manage visual resources under visual resource objectives. All proposed activities and projects in that area's VRM class must meet and/or comply with the applicable VRM objectives. Project-specific compliance with VRM objectives is determined by using a contrast rating system that assesses the degree of project-related changes to the existing landscape by assessing the potential changes to the existing form, line, color, and texture of landforms and/or water, vegetation, and structures. Visual impacts resulting from infill development can be calculated by analyzing the potential impacts from proposed surface disturbances and the number of proposed wells to assess their visual impact on the MBPA's VRM classes.

4.14.1 Direct and Indirect Effects

The MBPA has lands designated as VRM Class II, Class III, and Class IV. No VRM Class I lands (lands designated as having the highest visual resource quality) have been designated within the MBPA. VRM Class II management objectives are to retain the existing character of the landscape and allow only minor changes. VRM management objectives for Class III are to partially retain the existing character of the landscape, allowing for moderate change. VRM Class IV management objectives allow for major changes to the characteristic landscape that would accommodate management activities (BLM 2008b). **Table 4.14-1** summarizes the acreage of VRM class disturbed by each alternative.

TABLE 4.14.1-1
INITIAL SURFACE DISTURBANCE WITHIN THE MBPA
BY VRM CLASS AND ALTERNATIVE

VRM Class	Surface Acres	Existing Disturbance (acres)	Initial Surface Disturbance (acres)			
			Alt. A – Proposed Action	Alt. B – No Action	Alt. C – Field-wide Electrification	Alt. D – Agency Preferred Alternative
II	386	2	1	--	1	46[13]
III	20,837	597	2,452	7	3,007	1,384
IV	82,661	2,614	11,270	69	13,618	7,213
Total	**103,884**	**3,213**	**13,723**	**76**	**16,626**	**8,643**

Note: No VRM Class I lands are located within the MBPA.

4.14.1.1 Alternative A - Proposed Action

Under the Proposed Action, development would occur in BLM areas designated as VRM Class II, Class III, or Class IV. Construction of up to 5,750 well and associated pads, access roads, pipelines, and facilities would result in the initial disturbance of approximately 13,723 acres of VRM-classified lands. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 6,457 acres (see **Table 2.3-1**). **Table 4.14-1** shows the acres of potential initial surface-disturbing impacts within each VRM class. Approximately 2,452 acres of initial surface disturbance would occur in VRM Class III designated areas, and about 11,270 acres of disturbance would occur in VRM Class

[13] With the exception of the water collector well, surface disturbance would be precluded in riparian and 100-year floodplain habitats (which overlaps the Class II areas in the MBPA). Therefore, surface disturbance would be substantially lower in Class II areas than currently reflected on project maps and **Table 4.14-1**.

IV designated areas. Only one acre of VRM Class II land would be disturbed, due to existing roads that would require improvement or upgrade.

The proposed development within the designated VRM Class III and Class IV areas would be consistent with management objectives for these visual classes. These objectives would permit moderate to major changes to the characteristic landscape that would accommodate the level of surface disturbance and visual contrasts created by proposed development. VRM Class II objectives are more restrictive; however, given that only one acre of VRM Class II land would be disturbed, the effects of the Proposed Action would be negligible.

Short-term effects on visual resources would be related to surface disturbance reclamation success, and the effects would diminish as vegetation becomes re-established. However, the potential establishment of invasive species in surface-disturbed areas would increase the risks of wildland fire and would potentially alter short- and long-term scenic quality because of the visual contrasts created by fire. Short-term impacts on scenic quality from wildland fire would be in areas of relatively fast-growing herbaceous or forb vegetation, in which the visual contrasts would quickly diminish. Long-term impacts could occur within relatively slow-growing shrub or woodland areas (e.g., sagebrush or pinyon-juniper woodland). Regrowth of species in these areas, which could reduce visual contrasts, could take more than five years.

Section 4.7, *Vegetation*, discusses the potential effects associated with vegetation in more detail.

Short-term impacts also would include drilling rig visibility at drilling locations, because the rigs would be moved weekly or monthly depending on site-specific drilling depths. Long-term impacts would include pipeline, infrastructure and well pad visibility, as well as surface disturbances from well pad and access road construction.

As set forth in **Table 2.1-1**, the project would be required to comply with the provisions of Chapter 4 of the BLM's *Gold Book*, which specifies that existing topography would be used to screen roads, pipeline corridors, drill rigs, wells, and production facilities from view where practical. Newfield would paint all aboveground production facilities with approved colors (or specified standard environmental colors) to blend with adjacent terrain, except for facilities requiring safety coloration per OSHA requirements. New roads generally would be required to follow natural contours and provide visual screening and would be reclaimed to BLM standards. Pipeline ROW would be located within existing ROW, whenever possible. Aboveground facilities would be painted with appropriate, non-reflective standard environmental colors, as specified by the AO. The AO may also specify additional measures to reduce visual impacts of pipelines, such as topographic screening, vegetation manipulation, project scheduling, and traffic control procedures.

Potential direct impacts associated with the Proposed Action would include artificial light and related light pollution (e.g., sky glow) from night lighting required for night-time drilling. Night lighting would degrade scenic quality by contributing to the intrusive artificial lighting of oil and gas operations. This would be of particular concern in the Green River areas. Compliance with the provisions from the Gold Book described in the previous paragraph would reduce potential adverse impacts from lighting at well drilling sites.

The indirect visual effects of the development would include vehicle-related fugitive dust, which could adversely impact long-distance scenic quality. **Section 4.2**, *Air Quality*, provides more information on project effects associated with dust emissions.

4.14.1.2 Alternative B - No Action Alternative

Under the No Action Alternative, development would occur in BLM areas designated as VRM Class III or Class IV. No VRM Class II lands would be disturbed.

Under the No Action Alternative, construction of up to 788 wells and associated pads, access roads, pipelines, and facilities would result in the initial disturbance of approximately 76 acres of VRM-classified lands. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 74 acres (see **Table 2.4-1**). **Table 4.14-1** shows the acres of potential initial surface-disturbing impacts within each VRM class. Approximately 7 acres of initial surface disturbance would occur in VRM Class III designated areas, and about 69 acres of disturbance would occur in VRM Class IV designated areas. No VRM Class II lands would be disturbed. When compared to other alternatives, the No Action Alternative would have the least adverse impacts to visual resources, because fewer acres of surface disturbance would occur as a result of the proposed development.

The proposed development within the designated VRM Class III and Class IV areas would be consistent with management objectives for these visual classes, as described under the Proposed Action. Short-term effects on visual resources would be similar to those under the Proposed Action, although they would be less extensive because fewer numbers of acres would be disturbed. These effects would include those related to surface disturbance reclamation success, as described under the Proposed Action. **Section 4.7**, *Vegetation*, discusses the potential effects associated with vegetation in more detail.

Short-term impacts also would include drilling rig visibility at drilling locations. Long-term impacts would be similar to those under the Proposed Action, though less extensive. As noted in the discussion under the Proposed Action, the project would comply with the provisions of Chapter 4 of the BLM's *Gold Book* and would implement other requirements to reduce impacts on visual resources.

Potential direct impacts associated with the No Action Alternative would include artificial light and related light pollution from night lighting required for night-time drilling. However, these direct impacts would be less under the No Action Alternative than under the other alternatives because fewer wells would be drilled. Compliance with the provisions from the Gold Book described in the previous paragraph would reduce potential adverse impacts from lighting at well drilling sites.

The indirect visual effects of the development would include vehicle-related fugitive dust, which could adversely impact long-distance scenic quality. **Section 4.2**, *Air Quality*, provides more information on project effects associated with dust emissions.

4.14.1.3 Alternative C – Field-Wide Electrification

Under Alternative C, 5,750 wells would be proposed for drilling on federal, State and private lands in the MBPA – the same number as discussed under the Proposed Action. This would result in the initial disturbance of approximately 16,626 acres of VRM-classified lands. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 8,366 acres (see **Table 2.5-1**). **Table 4.14-1** shows the acres of potential initial surface-disturbing impacts within each VRM class. Under Alternative C, approximately 13,618 acres of initial surface disturbance would occur in VRM Class IV areas, and approximately 3,007 acres of disturbance would occur in VRM Class III areas. Only one acre of initial surface disturbance would occur in VRM Class II areas, due to existing roads that would require improvement or upgrade. No power lines or substations would be installed in the VRM Class II area.

The impacts to visual resources would be generally similar to those discussed under the Proposed Action, both short-term and long-term. Potential direct impacts associated with Alternative C would include artificial light and related light pollution with similar impacts to those of the Proposed Action. As with the Proposed Action, the indirect visual effects would include vehicle-related fugitive dust. **Section 4.2**, *Air Quality*, provides more information on project effects associated with dust emissions. However, with the installation of power lines and substations to support well operations, Alternative C would likely have greater visual impacts than the Proposed Action.

4.14.1.4 Alternative D - Agency Preferred Alternative

Under Alternative D, up to 5,750 wells would be proposed for drilling on federal, State and private lands in the MBPA. This would result in the initial disturbance of approximately 8,643 acres of VRM-classified lands. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 4,170 acres (see **Table 2.6-1**). **Table 4.14-1** shows the acres of potential initial surface-disturbing impacts within each VRM class. Under Alternative D, approximately 7,213 acres of initial surface disturbance would occur in VRM Class IV areas, and approximately 1,384 acres of disturbance would occur in VRM Class III areas. Approximately 46 acres of initial surface disturbance would occur in VRM Class II areas (see footnote 12). There are conceptual ROWs, proposed 160-acre spacing well pads utilized for directional drilling into the ACEC, and proposed 160-acre spacing Green River pads located within VRM Class II areas under this alternative.

The short-term and long-term impacts to visual resources would be the same as discussed under the Proposed Action, but the degree of impacts would be less because fewer acres of surface disturbance from infill development would be proposed under this alternative. More VRM Class II lands would be disturbed under Alternative D than under any other alternative. However, given that there are approximately 386 acres of VRM Class II lands within the MBPA, the amount that would be disturbed is small. Moreover, some of the initially disturbed area would be reclaimed after completion of well development, so the long-term disturbance would be less.

Potential direct impacts associated with Alternative D would include artificial light and related light pollution with similar impacts to those discussed under the Proposed Action. As with the Proposed Action, the indirect visual effects would include vehicle-related fugitive dust. **Section 4.2**, *Air Quality*, provides more information on project effects associated with dust emissions.

4.14.2 Mitigation

Proposed mitigation measures are the same under all alternatives. On-site visual reviews during the APD process would determine if sufficient mitigation could be applied to meet VRM class objectives. The following BLM VRM mitigation measures could be applied to reduce impacts to visual resources:

- Camouflage coloring, facility design, low-profile structures, proper placement, edge feathering along access roads and vegetation/road boundaries, and/or topographic screening would be used to reduce or eliminate the observable effects of well pads, roads, and infrastructure. Topographic screening and proper placement could include hiding the facilities behind ridge lines, in natural depressions, behind vegetation, or behind rock outcrops.
- Surface disturbances would be minimized by sharing ROWs, off-site directional drilling, and off-site placement of storage tanks.
- Pipelines would be buried in the road when feasible.

- In VRM Class II areas, night-lighting and light pollution sky glow impacts would be reduced (as feasible) by using only the minimal lighting required for safety and security, installing lights at the minimal heights required, and installing hoods on lights to reduce light diffusion.
- To preserve the integrity of viewsheds during APD processing, Newfield and the AO would perform the following actions when feasible:
  - Jointly determine the use of topographic features to serve as visual screens
  - Place facilities away from highly visible points such as ridgelines
  - Use low-profile tanks to reduce visibility where taller tanks would be more visible
  - Avoid excessive side-casting of earth materials from ridgelines and steep slopes
- Newfield would use centralized tank locations for water and condensate tanks to reduce visual impacts whenever possible. The feasibility of centralizing tank facilities would be determined on a site-specific basis.
- Unless no other alternative exists, surface disturbances would be avoided in VRM Class II areas.

4.14.3 Unavoidable Adverse Impacts

The presence of drilling rigs and the construction of well pads, pipelines, gas production infrastructure, and access roads would be an unavoidable consequence of well development and extraction. These activities would cause adverse surface disturbance and visual intrusion impacts to visual resources by introducing line, color, form, and textural contrasts onto the existing natural landscape in the long term, and by reducing the natural appearance present in some parts of the MBPA. Night-lighting would cause sky glow impacts in the short term to the river.

As discussed above, proposed development under Alternatives A, C, and D would impact designated VRM Class II areas. Site-specific visual analysis during the APD process would determine if sufficient mitigation could be applied to meet VRM Class II objectives. Where valid and existing leasing rights predate the current RMP, unavoidable adverse impacts to scenic quality could result from project-related development. However, BMPs for the site-specific use of buried pipelines and centralized water and condensate tank facilities would reduce the visual impacts of pipelines and tanks, where appropriate.

ACEPMs detailed in **Section 2.2.12.4** would reduce the impacts of buried pipelines for site-specific use on visual resources. In addition, ACEPMs detailed in **Section 2.2.12.9** would reduce visual impacts of centralized water and condensate tank facilities for site-specific use.

4.14.4 Irretrievable and Irreversible Commitments of Resources

There would be no irreversible impacts expected for visual resources as a result of the Proposed Action and alternatives. Areas of surface disturbances can be reclaimed; well bores can be capped and buried; pipelines can be removed; and access roads can be closed and reclaimed. There would be a long-term irretrievable loss of scenic quality during the approximate 41- to 51-year LOP resulting from the presence of the above-mentioned wells and infrastructure that would remain after an estimated 30-year lifetime for each producing well, until these structures are removed and/or the disturbed areas are reclaimed.

4.14.5 Relationship Of Short-Term Uses To Long-Term Productivity

The short-term development and extraction of fluid minerals resources would have long-term adverse impacts on visual resources and scenic quality. Surface disturbances from access road and well-pad construction, and the presence of drilling rigs would introduce line, form, color, and texture contrasts into the landscape. These contrasts would reduce long-term scenic quality by disturbing the existing character of the natural landscape during the LOP and after the project has ended until reclamation and revegetation have successfully obscured the project impacts. However, it is anticipated that the long-term adverse impacts to visual resources would still comply with BLM VRM objectives.

4.15 SPECIAL DESIGNATIONS

The MBPA contains or is near three specially designated areas that the BLM currently manages for conservation purposes under its multiple-use mandate. Two of these areas are designated as ACECs, and the third is part of an area considered suitable for WSR status. Potential impacts to each of those areas are discussed below. While each area is discussed individually in this section, it is important to note that two of the three areas overlap significantly (the Lower Green River Corridor ACEC and the proposed Lower Green River WSR), and the remaining area (Pariette Wetlands ACEC) overlaps partially with the other two areas. Therefore, potential impacts disclosed in this section are not of an additive nature. Approximately 11,757 acres of the existing Pariette Wetlands ACEC and 238 acres of the Lower Green River Corridor ACEC fall within the MBPA. There are currently no WSR areas designated in the MBPA, but approximately 286 acres of the MBPA are within the proposed Lower Green River WSR.

4.15.1 Direct and Indirect Effects

4.15.1.1 Alternative A - Proposed Action

4.15.1.1.1 Areas of Critical Environmental Concern

Pariette Wetlands ACEC

This ACEC is managed by the BLM VFO. The "relevant and important" values for which the Pariette Wetlands ACEC is designated are discussed in detail in **Section 3.15.1**. They include special-status bird and plant species habitat and wetland ecological systems and processes. If the Proposed Action were implemented, up to approximately 1,209 acres would be initially disturbed in the Pariette Wetlands ACEC. Approximately 376 wells, 21.9 miles of road and pipeline, and associated ancillary facilities would be constructed within the ACEC as a result of the Proposed Action. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to approximately 439 acres.

The potential direct and indirect impacts to vegetation are discussed in **Section 4.7**. As noted in **Section 4.7**, the Proposed Action would result in the initial disturbance of approximately 667 acres of wetlands, of which 246 acres would remain disturbed after reclamation. Although the acreage is not exactly known, it is expected that wetland areas within the Pariette Wetlands ACEC would be disturbed as a result of the Proposed Action.

The potential direct and indirect impacts to special-status species are discussed in **Section 4.10**. Special-status species that could potentially be disturbed by activities within the ACEC include western yellow-billed cuckoo, Uinta Basin hookless cactus, Pariette cactus, and several Colorado River fish species. Development in sensitive plant species habitat in the ACEC would be done in accordance with protection measures and stipulations, as discussed in **Section 4.10.2**. The potential effects to wildlife from development in the ACEC, along with related protection measures and mitigation, are discussed in **Sections 4.9.2** and **4.10.2**.

According to the Vernal RMP, the objective of the ACEC program is to designate and manage areas where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife resources; or other natural systems or processes; or to protect life and safety from natural hazards. This objective applies to both the Pariette Wetlands ACEC and the Lower Green River Corridor ACEC, which have values identified as requiring protection. It should be noted that the project applicant has oil and gas leases within the Pariette Wetlands ACEC that predate the ACEC designation and remain valid.

Lower Green River Corridor ACEC

The "relevant and important" values for which the Lower Green River Corridor ACEC is designated are discussed in detail in **Section 3.15.1**. They include riparian habitat and high-quality scenic values. Under the Proposed Action, approximately 1.6 acres would be disturbed within the Lower Green River Corridor ACEC, due to an existing ROW that would require improvement or upgrade. The improvement is considered unlikely to disturb existing riparian habitat in this ACEC. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to approximately 0.8 acres.

It is possible that well infrastructure would be visible from certain portions of the Lower Green River Corridor ACEC, thereby having an effect on scenic values. However, as discussed in **Section 4.14.1**, the Proposed Action would have very limited impact on high-quality (VRM Class II) landscapes. In addition, well infrastructure would be in general conformance with the ACEC visual objectives, because all permanent (on-site for 6 months or longer) structures constructed or installed at the well pads would be painted a flat, non-reflective earth-tone color to match one of the standard environmental colors, as determined by the appropriate SMA. Impacts to the Lower Green River Corridor ACEC as a result of the proposed water collector well would be likely minimal, given that there would be only 1.6 acres of surface disturbance in the floodplain during well construction and that the site would be reclaimed. Overall, there would be minimal impact on the relevant and important values for which the ACEC was designated (see **Section 3.15.2** for details).

4.15.1.1.2 Wild and Scenic Rivers

Even though no WSR areas have been designated within the MBPA, suitable WSRs have been carried forward in the Vernal RMP. Projects located within WSRs have the potential to impact the ORVs for which the river has been analyzed. For the proposed Lower Green River WSR, the ORVs are recreational use and fish habitat.

Under the Proposed Action, approximately 1.5 acres would be initially disturbed within the proposed Lower Green River WSR, and no wells or roads would be constructed. Following interim reclamation, residual surface disturbance would be reduced to approximately 0.75 acres. Therefore, there would be no substantial direct impacts to recreational uses in the immediate environment. The potential effects to fish habitat from the Proposed Action, along with related protection measures and mitigation, are discussed in **Sections 4.9.2** and **4.10.2**.

Indirect impacts to the ORVs for which the Lower Green River was found eligible for designation could include possible auditory disturbance to recreational users on the river, which is discussed in **Section 4.13**; potential visual intrusions in the middle-ground distance, which is discussed in **Section 4.14**; and potential increases in sedimentation and depletion of the river, the impacts of which are discussed in **Section 4.6**. The potential impacts on fish habitat are discussed in **Section 4.9**.

4.15.1.2 Alternative B - No Action Alternative

4.15.1.2.1 Areas of Critical Environmental Concern

Pariette Wetlands ACEC

The "relevant and important" values for which the Pariette Wetlands ACEC is designated are discussed in detail in **Section 3.15.1**. They include special-status bird and plant species habitat and wetland ecological systems and processes. The potential direct and indirect impacts to vegetation and to special-status species are discussed in **Sections 4.7** and **4.10**, respectively.

Under the No Action Alternative, up to approximately 62 acres would be initially disturbed in the Pariette Wetlands ACEC. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to approximately 45 acres. The No Action Alternative would have similar impacts on special-status species habitat or wetland ecological processes within the ACEC as the Proposed Action. However, these impacts would be substantially less due to the smaller number of acres impacted within the ACEC. In addition, as noted in **Section 4.7**, the No Action Alternative would result in the initial disturbance of approximately 29 acres of wetlands, of which 22 acres would remain disturbed after reclamation. It is expected that fewer wetland areas within the Pariette Wetlands ACEC would be disturbed as a result of this alternative. It should be noted that the project applicant has oil and gas leases within the Pariette Wetlands ACEC that predate the ACEC designation and remain valid.

Lower Green River Corridor ACEC

Under the No Action Alternative, no development would occur within the Lower Green River Corridor ACEC. Infrastructure visible from the ACEC would be in general conformance with the Lower Green River ACEC visual objectives because all permanent (onsite for six months or longer) structures constructed or installed at the well pads would be painted a flat, non-reflective earth-tone color to match one of the standard environmental colors, as determined by the appropriate SMA. Therefore, there would be no substantial impact to the relevant and important values for which the ACEC was designated.

Wild and Scenic Rivers

Under the No Action Alternative, no development would occur within the proposed Lower Green River WSR. Therefore, there would be no direct impacts to the ORVs in the immediate environment. Indirect impacts to the ORVs for which the Green River was found eligible for designation would be minimal, because no development would occur in the proposed WSR area.

4.15.1.3 Alternative C - Field-wide Electrification

4.15.1.3.1 Areas of Critical Environmental Concern

Pariette Wetlands ACEC

The "relevant and important" values for which the Pariette Wetlands ACEC is designated are discussed in detail in **Section 3.15.1**. They include special-status bird and plant species habitat and wetland ecological systems and processes. The potential direct and indirect impacts to vegetation and to special-status species are discussed in **Sections 4.7** and **4.10**, respectively.

If Alternative C were implemented, up to approximately 1,244 acres would be initially disturbed in the Pariette Wetlands ACEC. The same number of wells and miles of road and pipeline, and associated ancillary facilities would be constructed within the ACEC under this alternative as would occur under the Proposed Action. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to approximately 612 acres. As noted in **Section 4.7**, Alternative C would result in the initial disturbance of approximately 857 acres of wetlands, of which 380 acres would remain disturbed after reclamation. Impacts of Alternative C on special-status species habitat would be similar to those described under the Proposed Action, although they would be slightly greater due to the greater number of acres affected. It should be noted that the project applicant has oil and gas leases within the Pariette Wetlands ACEC that predate the ACEC designation and remain valid.

Lower Green River Corridor ACEC

Under Alternative C, approximately 1.6 acres would be disturbed within the Lower Green River Corridor ACEC, due to an existing ROW that would require improvement or upgrade. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to approximately 0.8 acres. Therefore, impacts on riparian habitat and high-quality scenic values would be similar to those described under the Proposed Action, and there would be minimal impact on the relevant and important values for which the ACEC was designated.

4.15.1.3.2 Wild and Scenic Rivers

Under Alternative C, approximately 1.5 acres would be initially disturbed within the proposed Lower Green River WSR, and no wells or roads would be constructed. Following interim reclamation, residual surface disturbance would be reduced to approximately 0.75 acres. Therefore, there would be no substantial direct impacts to the ORVs in the immediate environment, similar to conditions under the Proposed Action. Indirect impacts to the ORVs for which the Green River was found eligible for designation would be similar to those described under the Proposed Action.

4.15.1.4 Alternative D – Agency Preferred Alternative

4.15.1.4.1 Areas of Critical Environmental Concern

Pariette Wetlands ACEC

Based on the conceptual mapping of proposed project features, GIS calculations resulted in approximately 447 acres that could be initially disturbed in the Pariette Wetlands ACEC. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to approximately 206 acres.

The "relevant and important" values for which the Pariette Wetlands ACEC is designated are discussed in detail in Section 3.15.1.1. They include special-status bird and plant species habitat and wetland ecological systems and processes. The potential direct and indirect impacts to vegetation and to special-status species are discussed in Sections 4.7 and 4.10, respectively.

As discussed in Section 3.15.1.1, the primary management objective for the Pariette Wetlands ACEC is to protect the relevant and important values of special status bird and plant habitat, wetlands ecosystem values, waterfowl production, and soil (BLM 2008b). The BLM's management decisions for the ACEC emphasize seasonal and surface occupancy restrictions for protection of wildlife and plant species, protection of floodplains and erosive soils, and the management of vegetation to benefit riparian and watershed values.

Based on the salient Alternative D design features in Section 2.6, BLM would be able to protect these relevant and important values better than under Alternatives A or C. Specifically, based on surface disturbance restrictions that would substantially limit or preclude new disturbance in habitat for Sclerocactus, riparian habitat, 100-year floodplains, and wetlands, BLM is inherently conserving the integrity of these resources, along with protecting erosive soils that occur in these habitats. More information is provided below.

The nature of the conceptual mapping of a proposed project features resulted in GIS calculations of disturbance to wetland habitats from conceptually located pads and ROWs. However, it is important to note that during the site-specific APD process under Alternative D, impacts to wetland habitats would be avoided in accordance with the design features and mitigation measures defined in Sections 2.6.1 – 2.6.3.

As noted in Section 4.7, GIS calculations for Alternative D show initial disturbance of approximately 404 acres of wetlands (throughout the entire project area), of which 217 acres would remain disturbed after reclamation. Of the 404 acres of conceptual impacts to wetlands, approximately 45 acres are mapped within the boundaries of the ACEC.

As discussed within Section 3.10.1.2, within known and potential habitat for the Uinta Basin hookless cactus and Pariette cactus, the USFWS has proposed core conservation areas and management recommendations for S. wetlandicus and S. brevispinus species in response to the ongoing energy development in the Uinta Basin. The purpose of the proposed core conservation areas and management recommendations is to protect the most important populations or sub-populations, and reduce threats to both Sclerocactus species. Two levels of Core Conservation Areas were developed based on pollinator travel distance and habitat connectivity between populations and individuals. Under Alternative D, no new surface disturbance or well pad expansions would occur within Level 1 Core Conservation Areas inside the Pariette Wetlands ACEC. Surface disturbance within Level 2 areas (inside and outside the ACEC) would be minimized to the greatest extent practicable by using existing infrastructure (i.e., access roads and pipelines) and directional drilling from multi-well pads that would either require the expansion of existing well pads or the construction of a limited number of new multi-well pads. Concentrated use of existing well pads would reduce fragmentation of Sclerocactus habitat.

The magnitude of potential impacts related to direct habitat loss and displacement to waterfowl and waterfowl production would be considerably less under Alternative D because of restrictions on development resulting in lower surface disturbance (i.e., minimized surface disturbance and focused use of existing well pads on federal lands within wetlands, riparian habitats, floodplains, and the Pariette Wetlands ACEC). For example, under Alternative D there are 404 acres of wetland habitat (i.e., suitable habitat for waterfowl production) conceptually shown as potentially being disturbed within the entire MBPA, as compared to 667 acres under the Proposed Action and 857 acres under Alternative C. Reduced surface disturbance within wetland habitat (both inside and outside the ACEC) also means there would be less oil and gas activity in these areas which could indirectly benefit waterfowl production by reducing the potential for disturbance to or displacement from nesting and brooding habitat.

While conceptual surface disturbance calculations are not provided for floodplain habitats, Alternative D is better suited to protect this relevant and important value as no disturbance to floodplains would occur within the ACEC under Alternative D. Furthermore, surface disturbance within floodplains outside the ACEC would be limited to one acre for the proposed water collector well.

In addition, the design features under Alternative D will reduce the potential for this project to contribute to discharges of TDS, boron, and selenium to the impaired portion of Pariette Draw.

Lower Green River Corridor ACEC

Under Alternative D, no development would occur within the Lower Green River Corridor ACEC. Impacts on riparian habitat and high-quality scenic values within this ACEC would be similar to those described under the No Action Alternative. Therefore, there would be minimal impact on the relevant and important values for which the ACEC was designated.

4.15.1.4.2 Wild and Scenic Rivers

Under Alternative D, approximately 24 acres could be initially disturbed within the proposed Lower Green River WSR. Two wells and approximately 0.16 miles of roads and pipelines would be constructed within the proposed WSR area as a result of this alternative. Following interim reclamation, residual surface disturbance would be reduced to approximately 11.5 acres. The surface disturbance remaining after interim reclamation would be greater than under the other alternatives. Therefore, Alternative D could, have a direct impact on the recreational use ORV that is part of the proposed WSR. Water recreational uses would be unaffected by these land disturbances.

Indirect impacts to the ORVs for which the Lower Green River was found eligible for designation could include possible auditory disturbance to recreational users on the river, which is discussed in **Section 4.13**; potential visual intrusions in the middle-ground distance, which is discussed in **Section 4.14**; and potential increases in sedimentation and depletion of the river, the impacts of which are discussed in **Section 4.6**. The potential impacts on fish habitat are discussed in **Section 4.9**.

4.15.2 Mitigation

The following proposed mitigation measures could be applied to reduce impacts to special designations, with relevant and important ACEC value or ORV addressed by the measure in parentheses:

- Newfield and the AO would perform the following actions during APD processing when feasible:
  - Jointly determine the use of topographic features to serve as visual screens;
  - Place facilities away from highly visible points such as ridgelines;
  - Use low-profile tanks to reduce visibility where taller tanks would be more visible; and
    - Avoid excessive side-casting of earth materials from ridgelines and steep slopes (Scenic value in Lower Green River ACEC, recreational value in Lower Green River proposed WSR).
- Placement of tanks and drilling pads would be considered, and off-site tanks may be used to minimize visual impacts (Scenic value in Lower Green River ACEC, recreational value in Lower Green River proposed WSR).
- Newfield would use offsite tanks or centralized tank batteries at production locations to reduce visual impacts whenever possible. The feasibility of using offsite tanks or centralized tank batteries would be determined on a site-specific basis (Scenic value in Lower Green River ACEC, recreational value in Lower Green River proposed WSR).
- Directional drilling would be used to reduce or avoid impacts to the ACEC relevant values where feasible (All relevant and important values of ACECs and ORVs of proposed WSR).

4.15.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts to special designations include the following:

- Increases in the number of acres of disturbance to special status species' habitat within the Pariette Wetlands ACEC under the Proposed Action and Alternative C, and within the proposed WSR area under Alternative D.
- A reduction of noise-free and scenic qualities within the Pariette Wetlands ACEC and proposed WSR area under the action alternatives.
- A reduction of noise-free and scenic qualities within the Lower Green River Corridor ACEC under the Proposed Action and Alternative C.

4.15.4 Irretrievable and Irreversible Commitments of Resources

With proper mitigation and remediation, most special management area resources and values would have no projected irretrievable commitments of resources. The only potential irretrievable commitments of resources would be as follows:

- Reduction of noise-free and scenic qualities within the Lower Green River ACEC and proposed WSR area.
- Reduction of riparian and waterfowl habitat in Pariette Wetlands ACEC.
- Disturbance of special status plant species habitat within the ACECs.

These resources would be impacted irretrievably during the project time period because the former would be affected regardless of mitigation. Once the project is completed, these resources can be reclaimed.

4.15.5 Relationship of Short-Term Uses to Long-Term Productivity

Short-term uses related to well development could impact the long-term values of special designation areas in the following ways: direct disturbance to relevant values through removal of riparian resources, disturbance of special status species and wildlife habitat, disturbance and/or irreversible loss of cultural resources, and loss of scenic quality. However, the impacts of well development would not adversely affect the long-term productivity of the special designation area resources and values. During the operations phase of the project, impacts would continue for the LOP. However, long-term productivity would not be substantially impacted, because the level of impact to special designation area values is low and most impacts would be reclaimed.

4.16 SOCIOECONOMICS

The development of wells and associated infrastructure under each of the alternatives would directly impact the social and economic resources of the MBPA as a result of its employment requirements, capital expenditures, and tax and royalty payments. These direct impacts of development would also indirectly affect local housing availability, the population of Uintah and Duchesne Counties, and the demand for social services in those counties. For this EIS, social impacts are typically discussed qualitatively, because quantitative data that addresses such impacts are often not available. To the extent possible, economic impacts are quantified based on simplified assumptions and estimates of employment, production, and revenue.

4.16 Direct and Indirect Effects

4.16.1.1 Alternative A - Proposed Action

4.16.1.1.1 Population and Demographics

Because Duchesne and Uintah Counties have resource-based economies, the Proposed Action would contribute to the population growth that is driven by the recent increase in oil and gas development. It is assumed that the population would increase proportionately to the number of wells that would be developed under each alternative. The Proposed Action would have a greater impact on the population of these two counties than the other alternatives because it would drill the most wells.

Population would fluctuate throughout the LOP, with the highest increases in population occurring during the initial construction phase. Many oil/gas-related jobs are temporary in which certain workers may be needed for only a few months. Short-term employees are likely to stay in motels, apartments, and travel trailers on the job site, and would not likely contribute substantially to the permanent local population.

4.16.1.1.2 Employment and Income

The overall number of jobs available in the region surrounding the MBPA would likely increase as a result of the Proposed Action. Based on information in **Table 2.3.6-1** of this EIS, the Proposed Action would employ approximately 478 people on average per day throughout the construction phase, and 46 people on average per day throughout the operation and maintenance phase. The increase in employment would not occur all at once but would fluctuate over the LOP. In addition, jobs in the mining, construction, and services industries would also increase to serve the people employed in well construction and operations.

According to a report by the Utah Energy Office (UEO), the drilling and completion of one gas well in Uintah County would create 11.9 jobs in that county, while one gas well in Duchesne County would create 1.4 jobs. The difference in job creation most likely is due to the more advanced development of the oil and gas industry in Uintah County, while many expenditures in well development in Duchesne County would occur outside the county (UEO 2004). **Table 4.16.1.1.2-1** shows the anticipated employment that would be generated by each of the alternatives, based on these employment factors. As indicated in **Table 4.16.1.1.2-1**, the Proposed Action would create 32,743 jobs in Uintah and Duchesne Counties in total. It is possible that the number of jobs generated may increase, as further development of the oil and gas industry in Duchesne County may increase the jobs-per-well factor.

TABLE 4.16.1.1.2-1
JOBS CREATED AND PERSONAL INCOME PER ALTERNATIVE

Category	Alternative A – Proposed Action	Alternative B – No Action	Alternative C – Field-wide Electrification[3]	Alternative D – Agency Preferred Alternative
Number of Wells	5,750	788	5,750	5,750
Jobs Created[1]	32,743	4,487	32,743	32,743
Personal Income ($ million)[2]	3,619.5	496.0	3,619.5	3,619.5

[1]Assumes 11.9 jobs created per well in Uintah County and 1.4 jobs created per well in Duchesne County plus a division of wells between Uintah and Duchesne Counties proportional to county area within the MBPA (Duchesne County 59.1%, Uintah County 40.9%).

[2] Assumes personal income generated of $257,000 per well in Uintah County and $52,300 per well in Duchesne County plus a division of wells between Uintah and Duchesne Counties proportional to county area within the MBPA (Duchesne County 59.1%, Uintah County 40.9%).
[3] Assumes Alternative C is feasible to implement. See discussion in **Section 4.16.1.3**.
Source: UEO 2004.

In large part, initial well construction draws temporary employees to the region. Local employees in the retail and service trades are required to meet the needs of the temporary workers. Once well construction is complete, temporary workers leave the area and local employees are often hired to maintain wells. This suggests that mineral development boosts short-term employment levels, but does not maintain similar long-term levels (BLM 2008b). The unemployment rate would likely decrease temporarily as additional jobs in industry and service become available, although some of these jobs may be filled from people employed in other job sectors and by new workers who move to the area.

With increased employment opportunities and investment in well drilling and operations, overall income in Duchesne and Uintah Counties would increase from existing levels. Because it would drill more wells, the Proposed Action would have a greater impact on overall income than the No Action alternative. As indicated in Table **4.16.1.1.3-1** above, the Proposed Action would generate a total of approximately $3.6 billion in personal income in Uintah and Duchesne Counties. As with employment, overall income levels would fluctuate over the LOP, with the highest increases occurring during the initial construction phase when more workers would be employed. Since many of the jobs would be temporary, the overall income increase would be more modest as the project progresses, especially after construction work is completed.

4.16.1.1.3 Taxes and Revenue

According to the UEO, the drilling and completion of a single gas well would result in beneficial impacts to local governments from services provided as well as tax and other revenue received. Sources for this revenue include general sales tax, individual and corporate income tax, employee retirement, and motor fuel sales tax. Expenditures include intergovernmental, education, transportation, health, police, fire, and corrections (UEO 2004). **Table 4.16.1.1.3-1** shows the anticipated revenues and expenditures for the Uinta Basin area.

TABLE 4.16.1.1.3-1
NET REVENUES AND EXPENDITURES PER WELL, UINTA BASIN

Category	Estimated Dollars per Well	
	Uintah Co.	Duchesne Co.
Local Revenues	$31,800	$10,400
Local Expenditures	$10,600	$3,400
Net Local Revenues	$21,200	$7,000
State Revenues	$55,000	$10,100
State Expenditures	$8,000	$1,800
Net State Revenues	$47,000	$8,300

Note: The UEO assumes a 100-well per year drilling and completion project. This is in line with the assumption for the project of 6–11 wells completed per month (or 70–130 per year).
Source: UEO 2004.

Based on the assumptions regarding net revenue per well set forth in **Table 4.16.1.1.3-1** and a total of 5,750 wells proposed under the Proposed Action, net local revenue annually would total a maximum of approximately $73.6 million to Uintah County and Duchesne County, and $138.7 million to the State.. **Table 4.16.1.1.3-2** illustrates the maximum net local and State revenue that would be generated annually per alternative, with the Proposed Action and Alternative C being the highest among the alternatives.

TABLE 4.16.1.1.3-2
MAXIMUM ANNUAL NET REVENUE PER ALTERNATIVE

Category	Alternative A – Proposed Action	Alternative B – No Action	Alternative C – Field-wide Electrification	Alternative D – Agency Preferred Alternative
Number of Wells	5,750	788	5,750	5,750
Local Net Revenue ($ million)[1])*	73.6	10.1	73.6	73.6
State Net Revenue ($ million)[2]	138.7	19.0	138.7	138.7
Total Net Revenues ($ million)	**212.4**	**29.1**	**212.4**	**212.4**

[1]Assumes a net local revenue of $21,200 per well in Uintah County and $7,000 per well in Duchesne County over the life of the well (see **Table 4.16.1.1.3-1**) plus a division of wells between Uintah and Duchesne Counties proportional to county area within the MBPA (Duchesne County 59.1%, Uintah County 40.9%).).
[2] Assumes a net State revenue of $47,000 per well in Uintah County and $8,300 per well in Duchesne County over the life of the well (see **Table 4.16.1.1.3-1**) plus a division of wells between Uintah and Duchesne Counties proportional to county area within the MBPA (Duchesne County 59.1%, Uintah County 40.9%).
[3] Assumes Alternative C is feasible to implement. See discussion in **Section 4.16.1.3**.
Note: Totals may not equal sum of figures due to rounding.
Source: UEO 2004.

Duchesne and Uintah Counties would also expect increased property tax revenues from existing levels as more oil and gas wells become productive. As noted in **Section 3.16.3.6**, both counties receive a larger share of their property tax revenues from oil and gas operation than other counties in the state on average. The Proposed Action would at least maintain this condition and could potentially increase that share. However, property tax revenues would decline as wells go out of production.

Because no Indian trust leases or surface are present within the MBPA, no revenues are expected to be generated for the Ute Indian Tribe.

4.16.1.1.3 Quality of Living

4.16.1.1.4 Public Facilities and Services

Under the Proposed Action, the anticipated increase in population would increase the need for social services and infrastructure (BLM 2008b). Although the exact population increase cannot be accurately forecasted, any population increase would be accompanied by a proportional increase in demands on community resources such as police and fire protection. Both Duchesne and Uintah Counties are currently experiencing difficulties in keeping up with the demand on utilities and infrastructure. Advertisements are continually posted to maintain the infrastructure needs of the area, but there is an inadequate workforce to fill these positions (Ferguson, pers.comm., 2007, cited in BLM 2012b). Because the Proposed Action proposes about seven times more wells than the No Action Alternative, it would place proportionately more demands on the community infrastructure. Furthermore, the demand for public facilities and services under the Proposed Action would be similar to those for Alternatives C and D.

Increased revenues from well construction and production would provide affected jurisdictions with additional funding for their services. However, it is not known if the additional funds would adequately cover the costs for providing additional services to the population generated by the Proposed Action.

Crime

As noted above, the anticipated population increase would increase the demand for services such as police protection. In general, the volume of crime increases as the population increases, although a relationship between crime rates and increased population is less clear (Nolan 2004). As noted above, population in both Duchesne and Uintah Counties would likely increase. The extent of this increase is not known; however, the highest increases would likely occur during the initial construction phase and decrease as the wells are drilled. Consequently, there could be an increase in the number of crimes during the initial construction phase of the Proposed Action, but this number would decrease during the LOP. Because the Proposed Action is not expected to significantly affect the permanent local population, overall crime would not likely increase significantly from current levels, and may not change at all. However, the project could impact transient populations.

Project development may lead to increased opportunities for theft and vandalism at well sites during construction and drilling activities. The opportunities for crime under the Proposed Action would be similar to those for Alternatives C and D, because more wells would be drilled. Increased activity and well site monitoring would discourage crime and vandalism activities, as would the installation of on-site security measures by the construction and drilling contractors.

Housing

The annual housing demand resulting from the Proposed Action would be greatest during the development phase of the project and would decrease considerably during the long-term production phase as fewer workers are required to operate wells. Depending on the amount of oil and gas activity in the region that is occurring during the development phase, the existing housing stock may or may not accommodate the increased demand.

In the early 2000s, the housing market in the region was characterized by substantial increases in new single-family home construction, escalating prices, and increased numbers of manufactured housing and mobile home units. Short-term accommodations were being met through local campgrounds, hotels, and motels. The increase in hotel stays made it challenging to accommodate travelers and tourists at the height of the tourist season (Johnson, pers. comm., 2006, cited in BLM 2012b). In short, when oil and gas development was increasing in the early 2000s, housing availability was very low. Following the national economic slowdown in the late 2000s, housing availability in Uintah and Duchesne Counties has increased somewhat. Because the slowdown reduced both the pace of oil and gas development and increased unemployment, thereby generating an out-migration of workers, the demand for housing in the Uinta Basin has eased.

Thus, the incremental demand for housing as a result of the Proposed Action would have direct impacts on housing and tourism accommodations if oil and gas development is booming. The demand for short-term housing for in-migrants would likely lead to increasing numbers of manufactured and mobile homes as well as hotels and campsites. The increase in demand would cause an increase in housing prices and negatively affect affordability. Should the development occur when oil and gas in region is not at its peak, the supply of housing would be sufficient to meet the demand.

Given the amount of housing development that occurred in the early 2000s and the out-migration of workers in the late 2000s, the in-migrants who would work under the Proposed Action would find housing that is available and affordable. As noted in **Section 3.16.4.3**, housing costs in the Uinta Basin currently are approximately 85 percent of the statewide average. Numerous residential properties are available for sale, and there is a large stock of motel rooms and RV campgrounds available as temporary residences. As the project progresses, fewer employees would need to find housing.

4.16.1.1.5 Environmental Justice

For this analysis, applicable environmental justice guidance was applied to determine whether there could be a disproportionately high or adverse human health or environmental impact on low-income, minority, or tribal populations near the MBPA as a result of the implementation of the Proposed Action or action alternatives.

For many issues analyzed in the EIS, potential adverse impacts resulting from the Proposed Action or other alternatives would be site-specific to the MBPA. In these cases, environmental justice (EJ) communities would not be directly or indirectly impacted by changes to the MBPA. These resources include geology and minerals, paleontology, soils, water resources, vegetation, range resources, fish and wildlife, special status species, cultural resources, recreation, visual resources, and special designations. Thus, the only remaining resources that would be subject to adverse impacts as a result of the Proposed Action and would require further evaluation regarding potential adverse impacts to EJ communities are: air quality and greenhouse gases, land use and transportation, and socioeconomics. **Table 4.16.1.1.5-1** provides a list of resources and a rationale that was given as to whether the action alternatives would result in a disproportionate impact to EJ communities.

TABLE 4.16.1.1.5-1
POTENTIAL ENVIRONMENTAL JUSTICE IMPACTS
COMMON TO ALL ACTION ALTERNATIVES

Issue	Adverse Impact to EJ Communities?	Disproportionate Impact to EJ Communities?
Air Quality/Greenhouse Gases	Yes	No. Air quality impacts, greenhouse gas impacts, ozone impacts, visual impacts, and impacts from other AQRVs are regional and global in nature, not localized to EJ communities
Geology and Minerals	No. Impacts limited to MBPA.	N/A
Paleontological Resources	No. Impacts limited to MBPA.	N/A
Soils	No. Impacts limited to MBPA.	N/A

Issue	Adverse Impact to EJ Communities?	Disproportionate Impact to EJ Communities?
Water Resources	No. The proposed project would not impact community drinking water supplies.	N/A
Vegetation	No. Impacts limited to MBPA.	N/A
Range Resources	No. Impacts limited to MBPA.	N/A
Fish and Wildlife	No. Loss of wildlife habitat and movement corridors is not directly connected to EJ populations, as these populations are not dependent on wildlife.	N/A
Special Status Species	No. Loss of USFWS-designated critical habitat is not directly connected to EJ populations, as these populations are not dependent on special status species.	N/A
Cultural Resources	No. Impacts limited to MBPA.	N/A
Land Use and Transportation	Yes	No. Land use impacts would be limited to the MBPA. Increases in project-related vehicle traffic would go directly through the EJ communities and would contribute to an overall increase in traffic on U.S. Highway 40. All frequent users of U.S. Highway 40 would be impacted equally, without a disproportionate effect on EJ communities.
Recreation	No. Impacts limited to MBPA.	N/A
Visual Resources	No. Impacts to VRM areas would not be visible to EJ communities. Visual impacts in and around the MBPA would be experienced by all individuals, and not	N/A

Issue	Adverse Impact to EJ Communities?	Disproportionate Impact to EJ Communities?
	specifically by those in EJ communities.	
Special Designations	No. Impacts to special designation areas would be experienced by all individuals, and not specifically by those in EJ communities.	N/A
Socioeconomics	Yes	No. As royalty revenues are dispersed to counties, the local communities, including the EJ communities, would likely see beneficial economic impacts. Adverse impacts to population, employment, and housing would not likely disproportionately impact EJ communities. The workforce required to drill and complete wells would likely reside in more urban communities (where more services are available) and would not impact population and/or housing situation in the more rural EJ communities. The Proposed Action and alternatives could result in direct and indirect jobs for members of EJ communities, thus having a beneficial impact on EJ community employment opportunities.

Air Quality

Well field development would occur approximately 10 miles southwest of the Randlett CDP, which is the closest low-income and minority community. The Fort Duchesne and Whiterocks CDPs, also low-income and minority communities, are located approximately 13 and 25 miles north of the MBPA, respectively. The closest community to the MBPA is Myton, approximately 6 miles to the north.

Section 4.2.1.1.2 discusses potential near field impacts from the Proposed Action. The criteria pollutants modeled, including CO, PM_{10}, $PM_{2.5}$, NO_2, and SO_2, all have modeled impacts below the applicable standards. Additionally, all of the maximum impacts occur within 200 meters (0.12 miles) of the emitting sources. Thus, near-field effects would not have an adverse impact on EJ communities located more than 0.12 miles from the MBPA. These near-field effects are described in **Section 4.2.1.1.2**. Therefore, disproportionate adverse health impacts related to poor air quality are not likely in the EJ communities closest to the MBPA.

Land Use and Transportation

At the peak of production, the Proposed Action would generate at most 1,725 trips per day within the MBPA (see **Table 4.12.1.1.2-1**), although actual trips generated would likely be lower. Increases in project-related vehicle traffic would go directly through the EJ communities of Myton, Randlett, Fort Duchesne, and

Whiterocks, and would contribute to an overall increase in traffic on U.S. Highway 40. Prior to reaching Sand Wash Road west of Myton, project traffic would be confined to U.S. Highway 40, the main transportation corridor through most of the communities in the Uinta Basin. Although U.S. Highway 40 runs through Myton, this is also true of other non-EJ communities such as Vernal, Roosevelt, and Duchesne. Truck routes are currently signed in Myton, and heavy truck traffic warning signs are used by companies in accordance with UDOT rules. U.S. Highway 40 is the primary transportation route that links the EJ communities and other rural residents with services in Duchesne, Roosevelt and Vernal.

With the increased number of trips, the Proposed Action could increase the risk of traffic accidents more than any of the other alternatives. Members of the EJ communities, other Uinta Basin residents, and visitors who use the same transportation routes would all be subject to an increased probability of accidents, given their close proximity to the MBPA and their dependence on the larger cities in the area for goods and services. Because EJ community members are similarly dependent on U.S. Highway 40 as a main transportation route as other residents and workers in the Uinta Basin, they would not be disproportionately affected by traffic accident increases.

Socioeconomics

As royalty revenues are disbursed from the state to Uintah and Duchesne Counties as a result of the Proposed Action, the EJ communities could see increased funding to support economic development and infrastructure improvements. An increase in direct (well producers and operators) and indirect employment opportunities (service jobs that support the oil and gas industry) for members of the EJ communities could be provided as a result of the Proposed Action. Thus, an increase in funding and employment opportunities would provide a beneficial economic impact to the EJ communities near the MBPA.

4.16.1.2 Alternative B - No Action Alternative

4.16.1.2.1 Population and Demographics

Because Duchesne and Uintah Counties have resource-based economies, the No Action Alternative would contribute to the population growth that is driven by the recent increase in oil and gas development. It is assumed that the population would increase proportionately to the number of wells that would be developed under each alternative. Since this alternative would drill the fewest wells, the No Action Alternative would have a lesser impact on the population of these two counties than the other alternatives, including the Proposed Action.

As with the Proposed Action, population would fluctuate throughout the LOP under the No Action Alternative. The No Action Alternative is expected to contribute the least to the local population, since this alternative would have the fewest wells drilled, and therefore would attract the fewest workers.

4.16.1.2.2 Employment and Income

The overall number of jobs available in the region surrounding the MBPA would likely increase as a result of the drilling of proposed wells. Based on information in **Table 2.4.6-1** of this EIS, the No Action Alternative would employ approximately 468 workers on average per day during the construction phase, and 24 workers on average per day during the operation and maintenance phase. **Table 4.16.1.1.2-1** indicates that the No Action Alternative would create 4,487 jobs in Uintah and Duchesne Counties in total. The increase in employment would not occur all at once, but would fluctuate over the LOP. Other employment impacts discussed under the Proposed Action would apply to this alternative, although these impacts would be less extensive since fewer workers would be employed.

As indicated in **Table 4.16.1.1.2-1**, the No Action Alternative would generate a total of approximately $496.0 million in personal income in Uintah and Duchesne Counties. Personal income impacts discussed under the Proposed Action would apply to this alternative, although these impacts would be less extensive since less income would be generated. The No Action Alternative would generate the least personal income of all the alternatives.

4.16.1.2.3 Taxes and Revenue

Based on the assumption regarding net revenue per well in **Table 4.16.1.1.3-1** and a total of 788 wells proposed under this alternative, the annual net local revenue would total a maximum of approximately $10.1 million to Uintah County and Duchesne County, and $19.0 million to the State.. **Table 4.16.1.1.3-2** illustrates the maximum annual net local and State revenue per alternative. The maximum net local revenue that would be generated annually under the No Action Alternative would be the least among all the alternatives.

Duchesne and Uintah Counties would also expect increased property tax revenues from existing levels. The No Action Alternative would generate the least property tax revenue among the alternatives, due to the smaller number of wells that would be drilled.

4.16.1.2.4 Quality of Living

The impacts of the No Action Alternative on the quality of living in Duchesne and Uintah Counties - including impacts on public services, crime and housing – would be similar to those described under the Proposed Action. However, impacts are expected to be less extensive, because fewer workers would be employed. In fact, the No Action Alternative would have fewer quality of living impacts than any of the alternatives, because fewer wells would be drilled and fewer people would be employed.

4.16.1.2.5 Environmental Justice

Air Quality

The air quality setting for the No Action Alternative is the same as that described under the Proposed Action. The No Action Alternative would have the same air quality impact on EJ communities as would occur under the Proposed Action. Impacts under the No Action Alternative would likely be even less, due to the fewer number of wells that would be developed.

Land Use and Transportation

At the peak of production, the No Action Alternative would generate at most 233 trips per day within the MBPA (see **Table 4.12.1.1.2-1**), although actual trips generated would likely be lower. Traffic impacts on EJ communities under the No Action Alternative would be similar to those described under the Proposed Action. However, impacts under the No Action Alternative would be less extensive, due to the lower level of well development and the lower amount of traffic that would be generated.

Socioeconomics

As royalty revenues are disbursed from the state to Uintah and Duchesne Counties as a result of the Proposed Action, the EJ communities could see increased funding to support economic development and infrastructure improvements. An increase in direct (well producers and operators) and indirect employment opportunities (service jobs that support the oil and gas industry) for members of the EJ communities could be provided as a result of the No Action Alternative. Thus, an increase in funding and employment opportunities would provide a beneficial economic impact to the EJ communities near the MBPA, although the No Action Alternative would provide less of this beneficial impact than the other alternatives.

4.16.1.3 Alternative C – Field-wide Electrification

4.16.1.3.1 Population and Demographics

Because Duchesne and Uintah Counties have resource development–based economies, Alternative C would contribute to current population growth driven by the recent increase in oil and gas development. It is assumed that the population would increase proportionately to the number of wells that would be developed under each alternative. Since Alternative C would have the same number of wells as the Proposed Action, population impacts would also be the same. However, this assumes that Alternative C would be a feasible development alternative. As discussed below, costs associated with electrification would likely make this alternative economically infeasible. If Alternative C is infeasible, then existing population conditions would not change.

4.16.1.3.2 Employment and Income

The overall number of jobs available in the region surrounding the MBPA would likely increase as a result of the drilling of proposed wells. Based on information in **Table 2.5.3-1** of this EIS, Alternative C would employ approximately 486 workers on average per day during the construction phase, and 46 workers on average per day during the operation and maintenance phase. Approximately eight more workers would be employed during the construction phase under this alternative than under the Proposed Action, because transmission lines and substations would need to be built along with other central facilities. **Table 4.16.1.1.2-1** indicates that Alternative C would create 32,473 jobs in Uintah and Duchesne Counties in total – the same number as under the Proposed Action. The increase in employment would not occur all at once, but would fluctuate over the LOP. Other employment impacts discussed under the Proposed Action would apply to this alternative.

As indicated in **Table 4.16.1.1.2-1**, Alternative C would generate a total of approximately $3.6 billion in personal income in Uintah and Duchesne Counties. Personal income impacts discussed under the Proposed Action would apply to this alternative.

However, the employment and personal income figures assume that costs associated with constructing an infrastructure for electrification would make the alternative feasible. According to the project applicant, implementation of Alternative C would require the installation of eleven generating stations comprised of two 20MW gas turbine generators and one 10MW steam turbine, which combined would generate 550MW of electricity. The project applicant has estimated the lifetime cost of self-generation at $600 million each for 11 generation stations, including distribution systems but excluding on-drill pad electrification costs and fuel value. About 57% of the generated supply would be for Green River development, with the balance for Deep Gas wells. All costs (facility, distribution and wells), reduced to a per-Green River-well basis, exceeds $1.4 million. This amount exceeds all current well specific development costs (i.e., current drilling, completion and facility costs combined) and would make Green River wells uneconomical to develop. Deep Gas cost, on a per well basis, would be $1.14 million. If Alternative C is economically infeasible, then no wells would be developed, and no jobs or personal income gains would be realized. In addition, if Alternative C were determined to be economically infeasible, both Newfield and the non-operating working interest owners would not realize any income from the MBPA.

4.16.1.3.3 Taxes and Revenue

Based on the assumption regarding net revenue per well in **Table 4.16.1.1.3-1** and a total of 5,750 wells proposed under this alternative, annual net local revenue would total a maximum of approximately $73.6 million to Uintah County and Duchesne County, and $138.7 million to the State – the same as what would be expected under the Proposed Action. **Table 4.16.1.1.3-2** illustrates the maximum annual net local revenue per alternative. The projected revenues under Alternative C assume that well drilling and operation would occur. The electrification of well operations would impose additional costs that would likely make the alternative economically infeasible. Section 4.16.1.3.3 further discusses this issue. If Alternative C was selected and the project applicant concluded that the wells would be infeasible to drill, no revenues would be realized.

Duchesne and Uintah Counties would also expect increased property tax revenues from existing levels as more oil and gas wells become productive. Alternative C would generate property tax revenues at the same level as those under the Proposed Action. Again, this assumes that Alternative C is economically feasible. If it would be economically infeasible to implement this alternative, then no property tax revenues would be realized.

4.16.1.3.4 Quality of Living

The impacts of Alternative C on the quality of living in Duchesne and Uintah Counties - including impacts on public services, crime and housing – would be the same as those described under the Proposed Action. Because Alternative C would have the same number of wells drilled as the Proposed Action, about the same number of employees and the same attendant quality of living impacts would be expected. However, if Alternative C would be economically infeasible to implement, then there would be no impact to existing quality of living conditions.

4.16.1.3.5 Environmental Justice

Air Quality

The air quality setting for Alternative C is the same as that described under the Proposed Action. Alternative C would have less of an air quality impact on EJ communities than would the Proposed Action, since electricity would be used for operations rather than fuel-based equipment.

Land Use and Transportation

At the peak of production, Alternative C would generate at most 1,725 trips per day within the MBPA – the same number that would occur under the Proposed Action; however, actual trips generated would likely be lower. Traffic impacts on EJ communities under Alternative C would be the same as those described under the Proposed Action.

Socioeconomics

Socioeconomic impacts on EJ communities under Alternative C would be the same as those described under the Proposed Action, because the number of wells that would be developed would be the same. However, if Alternative C is considered economically infeasible to implement, then some of the identified impacts on EJ communities would not occur, while other impacts may be worse, as no employment opportunities would be available and no income would be realized for EJ community residents.

4.16.1.4 Alternative D – Agency Preferred Alternative

4.16.1.4.1 Population and Demographics

Because Duchesne and Uintah Counties have resource-based economies, Alternative D would contribute to the population growth that is driven by the recent increase in oil and gas development. It is assumed that the population would increase proportionately to the number of wells that would be developed under each alternative. Alternative D would have the same impact on the population of these two counties as under the Proposed Action. As with the Proposed Action, population would fluctuate throughout the LOP under Alternative D.

4.16.1.4.2 Employment and Income

The overall number of jobs available in the region surrounding the MBPA would likely increase as a result of the drilling of proposed wells. Based on information in **Table 2.6.6-1** of this EIS, Alternative D would employ approximately 478 workers on average per day during the construction phase, and 46 workers on average per day during the operation and maintenance phase – the same as under the Proposed Action. **Table 4.16.1.1.2-1** indicates that Alternative D would create 32,743 jobs in Uintah and Duchesne Counties in total – also the same as under the Proposed Action. The increase in employment would not occur all at once, but would fluctuate over the LOP. Other employment impacts discussed under the Proposed Action would apply to this alternative.

As indicated in **Table 4.16.1.1.2-1**, Alternative D would generate a total of approximately $ 3.6 billion in personal income in Uintah and Duchesne Counties – the same as under the Proposed Action. Personal income impacts discussed under the Proposed Action would apply to this alternative.

4.16.1.4.3 Taxes and Revenue

Based on the assumption regarding net revenue per well in **Table 4.16.1.1.3-1** and a total of 5,750 wells proposed under this alternative, annual net local revenue would total a maximum of approximately $73.6 million to Uintah County and Duchesne County, and $138.7 million to the State – the same as what would be expected under the Proposed Action. **Table 4.16.1.1.3-2** illustrates the maximum annual net local revenue per alternative. However, due to circumstances pertaining to some of the leases, the revenues generated under Alternative D would be at a lower level than those under the Proposed Action.[i]

Duchesne and Uintah Counties would also expect increased property tax revenues from existing levels as more oil and gas wells become productive. Alternative D would generate property tax revenues at the same level as those under the Proposed Action.

4.16.1.4.4 Quality of Living

The impacts of Alternative D on the quality of living in Duchesne and Uintah Counties - including impacts on public services, crime and housing – would be similar to those described under the Proposed Action. Alternative D would have the same quality of living impacts as those under the Proposed Action.

4.16.1.4.5 Environmental Justice

Air Quality

The air quality setting for Alternative D is the same as that described under the Proposed Action, sine the same number of wells would be drilled. Alternative D would have the same air quality impact on EJ communities as would the Proposed Action.

Land Use and Transportation

At the peak of production, Alternative D would generate at most 1,725 trips per day within the MBPA (see **Table 4.12.1.1.2-1**), although actual trips generated would likely be lower. Traffic impacts on EJ communities under Alternative D would be the same as those described under the Proposed Action.

Socioeconomics

Socioeconomic impacts on EJ communities under Alternative D would be the same as those described under the Proposed Action, due to the same number of wells being developed.

4.16.2 Unavoidable Adverse Impacts

Given that natural resource development is finite and based on demand, the Uinta Basin is susceptible to a boom-and-bust cycle. While the proposed development would temporarily have positive impacts on the local economy, the depletion of the resource in the long term may result in an adverse impact to the economy. Those who had been dependent on the jobs and revenue associated with the project would be adversely impacted. Typically, the “bust” portion of the economic cycle adversely impacts nearly every sector of the economy, including employment/unemployment, housing, population, poverty rates, public finances, and infrastructure.

4.16.3 Irretrievable and Irreversible Commitments of Resources

The extraction of oil and gas would result in a permanent loss of natural resources. The irretrievable loss of oil and gas would preclude future revenues for local, state, and federal governments and the local communities. In addition, development and production of the energy resources located in the MBPA would require the investment of human, natural, and monetary resources. Most of those investments would be irretrievable and may preclude or exclude opportunities associated with other alternatives.

4.16.4 Relationship of Short-Term Uses to Long-Term Productivity

Development and production of the energy resources located in the MBPA would provide economic support for local households. Communities would benefit from additional investments, and public entities would derive revenues from the economic activities. Development of these resources also would benefit residential, commercial, and industrial consumers outside the region. Some of the infrastructure put in place to serve this project also may support future production and distribution of energy resources from other deposits in the region or nearby area.

However, higher short-term development and production rates have potential trade-offs in social and economic conditions when compared to those that would exist over a longer time horizon, assuming lower, more sustained development and production levels. **Section 4.16.3** discusses some of these trade-offs. Furthermore, the consumption of the energy resources in the short term would preclude its use at a future time.

[i] After BLM review of the terms of the 10 BLM leases and the Unit Agreement, it has been determined that eight BLM leases are committed to the Greater Monument Butte Unit and are held by Unit production. The Greater Monument Butte Unit is a secondary recovery unit. This unit was approved by the BLM and the SITLA. In addition, the unit was approved by the Utah Board of Oil, Gas and Mining under Utah Statutes 40-6-7 and 40-6-8. All tracts have undergone compulsory unitization and are considered fully committed to the unit area.

Utah Statute 40-6-8(5) explicitly provides:

5) An order providing for unit operations may be amended by an order made by the board in the same manner and subject to the same conditions as an original order providing for unit operations, provided:

(a) If such an amendment affects only the rights and interests of the owners, the approval of the amendment by the owners of royalty, overriding royalty, production payments and other such interests which are free of costs shall not be required.

(b) No such order of amendment shall change the percentage for the allocation of oil and gas as established for any separately owned tract by the original order, or change the percentage for allocation of cost as established for any separately owned tract by the original order

In addition to this, the unit agreement does not provide for contraction or elimination of lands from the unit area.

However, to technically develop these leases, Newfield has estimated that eight new multi-well pads encompassing between 6 and 50 acres of surface disturbance would be necessary in Level 1 Core Conservation Areas for Sclerocactus. These eight well pads are not evaluated in the agency preferred alternative (although they are included within the range of alternatives). Therefore, it is anticipated that under Alternative D, some undetermined amount of oil and gas resources contained within these leases, (whatever can't be reached by directional drilling from areas outside the Core 1 areas) with the attendant royalties, taxes, and other revenues, would not be realized under Alternative D.

5.0 CUMULATIVE IMPACTS

5.1 Introduction

This section analyzes the cumulative impacts to specific resource values and uses that could occur from implementation of the Proposed Action and the other alternatives, in conjunction with other impacts from past, ongoing, and reasonably foreseeable future actions. In addition to the evaluation of direct impacts, NEPA regulations require an assessment of cumulative impacts (40 C.F.R § 1508.7, 1508.25). CEQ regulations implementing NEPA define a cumulative impact as:

> "... The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The following sections identify the time frame for effects; the past, present, and reasonably foreseeable future projects to be analyzed; and the cumulative impacts for each resource. The primary human influences in the area have been oil and gas development, historic and current Gilsonite mining, and livestock grazing. The compilation of these actions provides the basis for estimating future environmental changes that may affect the extent and quality of the natural and human environment. **Figure 5.1-1 (Attachment 1)** shows the locations of past, present, and reasonably foreseeable future actions included in the general cumulative effects area for oil and gas field development projects.

The geographic scope of each specific Cumulative Impact Analysis Area (CIAA) varies by resource and is larger for resources that are mobile or migrate, as compared to those that are stationary. The CIAA for many of the resources discussed in this section includes the watersheds that intersect the MBPA. For some resources, the CIAA is smaller due to the geographically confined nature of cumulative impacts (e.g., areas of special designation), while for others the CIAA is much larger and includes both Duchesne and Uintah Counties (e.g., socioeconomics). **Table 5.1-1** identifies the CIAAs for individual resources and resource issues, along with the rationale for the selection of each area. **Figure 5.1-2 (Attachment 1)** depicts each of the resource specific CIAAs within the greater cumulative impact area for the EIS.

In general, the timeframe of the analysis is the 41- to 51-year LOP anticipated under the Proposed Action and Alternatives C and D. However, the timeframe of cumulative impacts may vary from one resource value or use to another, depending on variations in the duration of different actions.

Although much of this analysis focuses on adverse cumulative impacts, cumulative impacts may also be beneficial. For example, there are significant positive cumulative economic effects of oil and gas development, including additional employment opportunities in the region, additional tax revenues to local governments, and increased royalties to the federal government.

TABLE 5.1-1
CUMULATIVE IMPACT ANALYSIS AREAS

Resource	Cumulative Impacts Analysis Area	Study Area Rationale
Air Quality	Uinta Basin, nearby Class I areas	Construction, development, and production activities from implementation of the alternatives would cumulatively contribute to changes in air quality occurring immediately adjacent to the MBPA and within the greater Uinta Basin.
Geology and Minerals – Topography, Physiography, Oil and Gas Resources, and Other Leasable, Locatable, and Saleable Minerals	MBPA	Oil and gas operations would have an impact on subsurface resource uses located within the MBPA and underlying the MPBA, either by contaminating other possible mineral resources or preventing access to those sources.
Geology and Minerals – Tar Sands	Special Tar Sand Areas Entirely or Partially within the MBPA	Oil and gas operations would have an impact on the commercial extraction of tar sands within STSAs by impeding the development of tar sand extraction facilities and operations.
Geology and Minerals – Oil Shale	Known Oil Shale Lease Areas Entirely or Partially within the MBPA	Oil and gas operations would have an impact on oil shale extraction activities within KOSLAs by impeding the development of oil shale extraction facilities and operations.
Paleontological Resources	MBPA plus Geographic Extent of Related Paleontological Resources	Construction activities resulting in destruction or damage to paleontological resources could impact BLM's future ability to understand a region's history.
Soil Resources	All Watersheds within the MBPA	Project activities impacting soils would only affect soil types present in the Greater Monument Butte watersheds and would not cause additive affects to those occurring elsewhere.
Water Resources[1]	All Watersheds within the MBPA	Because all project activities would occur in the Greater Monument Butte watersheds, impacts associated with these activities would only affect these watersheds and would not cause additive affects to those occurring elsewhere.
Vegetation[2]	All Watersheds within the MBPA	Project activities impacting vegetation would only affect species present in the watersheds of the MBPA and would not cause additive affects to those occurring elsewhere.

Resource	Cumulative Impacts Analysis Area	Study Area Rationale
Range Resources	All Grazing Allotments within the MBPA	Because all project activities on BLM-administered lands would occur on these allotments, impacts associated with these activities would only affect these areas and would not cause additive effects to those occurring elsewhere.
Fish and Wildlife	Terrestrial Wildlife: Species-specific habitats within the Watersheds of the MBPA Fish: All Watersheds within the MBPA	Only activities occurring within potential habitat or near individual special status plant, fish, and wildlife species would contribute to impacts.
Special Status Plant, Fish, and Wildlife Species	Extent of Potential Habitat for the Uinta Basin hookless cactus and Pariette cactus; all Watersheds within the MBPA for all other special status plant, fish, and wildlife species	Only activities occurring within potential habitat or near individual special status plant, fish, and wildlife species would contribute to impacts.
Cultural Resources	MBPA	Construction activities resulting in destruction or damage to cultural resources could impact BLM's future ability to understand a region's history.
Land Use and Transportation	MBPA	Because all construction and land disturbance occurs within the MBPA, impacts to land use and transportation would be limited to the MBPA and would have no additive impacts on the surrounding lands and roads.
Recreation Resources	MBPA and a 2-mile Buffer Surrounding the MBPA	Impacts to recreation resources would be limited to a 2-mile buffer surrounding and including the MBPA from which public users may hear industrial noise, increased traffic, etc. from oil and gas operations. Impacts associated with these activities would only affect these areas and would not cause additive effects to those occurring elsewhere.
Visual Resources	Lower Green River ACEC and the Wild and Scenic Green River Corridor Plus Areas Surrounding the MBPA from which Project Impacts can be Viewed	Project activities impacting visual resources could cause additive visual impacts to resources within the MBPA and to areas outside the MBPA but within the viewshed of project-related impacts.
Special Designations	Special Designation Areas within the MBPA and within the Viewshed of the MBPA	Direct effect would come from those ground disturbing activities that occur directly within these special designation areas and from areas within the viewshed of the MBPA.

Resource	Cumulative Impacts Analysis Area	Study Area Rationale
Socioeconomics	Uintah and Duchesne Counties	This spatial boundary was selected because oil and gas development within the Uinta Basin has had substantial impact on taxes and royalties collected by the State of Utah, a portion of which has been reallocated to Duchesne and Uintah Counties. Because minority, low-income, and Tribal populations currently reside in these counties, they would all be considered when evaluating environmental justice concerns for oil and gas projects.

[1] Includes floodplains.

[2] Includes noxious and invasive weeds, and wetland/riparian zones.

5.2 Air Quality

The CIAA for air quality includes the Uinta Basin and regional Class I areas, sensitive Class II areas, and sensitive lakes located in eastern Utah and western Colorado. The CIAA is the same as the far-field impact modeling domain shown in the AQTSD, **Appendix B**. For the CIAA, potential emissions from the proposed project, existing nearby permitted sources, and RFD within the region must be assessed. Areas of concern include the Uinta Basin, the High Uintas Wilderness Area, nearby PSD Class I areas such as Arches and Canyonlands National Parks, nearby sensitive Class II areas such as Dinosaur National Monument, and distant Class I and II areas and sensitive lakes. Potential cumulative air quality impacts were assessed by comparing project impacts to the NAAQS, PSD increments (as a point of information only, not a regulatory PSD assessment), and AQRV impacts. The AQRV impacts include potential changes in regional haze, potential adverse acid deposition (total nitrogen and sulfur deposition), and potential change in ANC of sensitive lakes located in the Rocky Mountains of Colorado.

The BLM in Utah manages air resources with guidance defined through its Air Resource Management Strategy, or ARMS (BLM 2011). As part of this strategy, BLM contracted with AECOM Environment, Inc. (AECOM) and Sonoma Technology, Inc. (STI) to develop a reusable photochemical modeling platform to be used to analyze predicted cumulative air quality and air quality related values impacts in the Uinta Basin. The modeling study was completed in September of 2014 (BLM 2014). The final report is one of several documents that were developed for the ARMS Modeling Project, including a modeling protocol, Model Performance Evaluation (MPE) Reports for the meteorological model and the air quality model, and an emissions inventory report. The ARMS Modeling Project is not a project-specific NEPA analysis, and the modeling files and reports are not NEPA products. It also is not a policy study, analysis of regulatory actions, or an analysis of the impacts of project-specific development. Rather, the ARMS Modeling Project is a cumulative assessment of potential future air quality impacts associated with predicted oil and gas activity in the Uinta Basin. The ARMS Modeling Project provides data, models, and estimates of future air quality impacts to facilitate BLM's future NEPA and land use planning efforts.

The following model simulations were conducted to analyze potential future year impacts:

- Typical Year Modeling. A typical year emissions inventory was developed by annualizing the base year 2010 emissions for key source groups. Annualizing the base year emissions inventory provides a consistent basis for estimating the change in impacts due to future year activities. Annualizing the base year emissions is important, since future year emissions are also annualized. The typical year emissions inventory was modeled with the preferred model and configuration and using the 2010 meteorological data developed for the base year conditions simulation.

- Future Year Scenarios. The objective of the future year model simulations was to evaluate the potential cumulative air quality impacts of projected oil and gas development in the Uinta Basin relative to the typical year modeled air quality and AQRVs. This analysis was performed using the 2010 meteorological data developed for the base year simulation but with the future year emissions inventories developed for 2021. The future year analysis includes four scenarios:

    − 2021 On-the-books (OTB) case. A maximum emissions year with applicable on-the-books controls applied. The future year 2021 was selected as this maximum emissions year based on projected development in the Uinta Basin and the time-horizon selected for future year analysis.
    − 2021 Scenario 1. A control scenario with NOx emissions controls was developed and applied to the emissions inventory for 2021
    − 2021 Scenario 2. A control scenario with VOC emissions controls was developed and applied to the emissions inventory for 2021; and
    − 2021 Scenario 3. A control scenario with combined NOx and VOC emissions controls was developed and applied to the emissions inventory for 2021

Assessment areas were selected for analysis of model results and include all regional Class I areas and other environmentally sensitive areas (e.g., national parks and monuments, wilderness areas, etc.) near the Uinta Basin. Cumulative air quality impacts within the Uinta Basin study area were assessed for:

- Criteria pollutants, including nitrogen dioxide (NO_2), CO, SO_2, ozone, PM_{10}, and $PM_{2.5}$; and

- AQRVs (limited to applicable Class I, sensitive Class II areas, and sensitive lakes), including changes in visibility, atmospheric deposition, and the Acid Neutralizing Capacity (ANC).

In general, it is found that the highest modeled ozone occurs in the Uinta Basin study area regardless of model scenario and that all scenarios predict exceedances of the ozone NAAQS and state AAQS in the Uinta Basin. Typically, the ozone concentrations are highest during the winter period in the Uinta Basin, while the ozone concentrations are highest during the summer period in Class I and Class II areas outside the Uinta Basin study area (i.e., Class I and sensitive Class II assessment areas excluding Dinosaur National Monument, the High Uintas Wilderness Area, and the Uintah and Ouray Indian Reservation).

During non-winter months in the Uinta Basin, the model predicts that ozone may exceed the NAAQS and state AAQS; however, model-adjusted results from the MATS tool indicate that non-winter ozone concentrations are below the NAAQS and state AAQS for all monitors and areas analyzed. Furthermore, the future year mitigation scenarios have minimal effect on model-predicted ozone concentrations during non-winter months. For these reasons, the ozone assessment focuses on the relative differences between the model scenarios and the corresponding effects on winter ozone concentrations in the Uinta Basin study area.

When evaluating the ozone impacts associated with the future year mitigation scenarios, 2021 Scenario 2 tends to have the lowest ozone relative to all other future year scenarios. The 4th highest daily maximum

8-hour ozone concentration in 2021 Scenario 2 is 3 ppb lower compared to the 2021 OTB Scenario, while 2021 Scenarios 1 and 3 are predicted to have higher ozone impacts than either the 2010 Typical year and the 2021 OTB Scenario. 2021 Scenarios 1 and 3 are fairly similar to each other. Both scenarios predict a relatively large increase in ozone concentrations within the vicinity of Ouray (where the concentrations are already largest), indicating less potential ozone benefits associated with NOx control mitigation measures.

When comparing Scenario 2 to the OTB Scenario, a potential reduction in ozone concentrations occurs in the vicinity of the Ouray site. While the reduction of ozone is not particularly large, there is no predicted ozone disbenefit associated with Scenario 2 mitigation measures (i.e., there is no area with predicted ozone increases relative to the OTB Scenario). That Scenario 2, which is designed to reduce VOC emissions, provides the lowest ozone impacts of all future year scenarios supports the assessment that peak ozone impacts are in VOC-limited areas.

While all modeled NO_2, CO, SO_2, $PM_{2.5}$, and PM_{10} values are well below the NAAQS and state AAQS in the Uinta Basin, the model performance is an important consideration to qualify and understand the model-predicted concentrations of these pollutants. The model performance evaluation for $PM_{2.5}$ and PM_{10} indicated a negative model bias throughout the year in the 4-km domain (AECOM and STI 2014) with the largest bias occurring in summer. As a result, the model-predicted $PM_{2.5}$ and PM_{10} concentrations may underestimate future impacts. Model-adjusted results from the MATS tool, which account for model performance biases, indicate that $PM_{2.5}$ concentrations may exceed the NAAQS and state AAQS for select monitors and assessment areas. There are seven monitoring stations within the 4- km domain with daily $PM_{2.5}$ concentrations that exceed the NAAQS and state AAQS during the baseline.

All future model scenarios predict that only one of these monitoring station would continue to exceed the NAAQS and state AAQS. For annual $PM_{2.5}$, no monitoring stations within the 4-km domain exceed the NAAQS and state AAQS during the baseline or future years; however, two unmonitored areas within the Uinta Basin exceed the NAAQS and state AAQS during the baseline and impacts in these areas tend to increase for all future year scenarios except for mitigation Scenario 3. It is predicted that under mitigation Scenario 3, the annual $PM_{2.5}$ impacts would decrease in the Uinta Basin relative to the baseline due to a reduction of combustion control measures.

The future year scenarios generally have lower NO_2, CO, SO_2, $PM_{2.5}$, and PM_{10} concentrations than the 2010 Typical Year scenario, except for areas within the Uinta Basin. In the future year, all assessment areas are within the applicable PSD increments for annual NO_2, 3-hour SO_2, annual SO_2, and annual PM_{10}, while most assessment areas exceed the 24-hour $PM_{2.5}$ PSD increment.

Visibility conditions in Class I and sensitive Class II areas generally show improvement in the 2021 future year scenarios relative to the 2010 Base Year and 2010 Typical Year. There are not substantial differences in the 20th percentile best and worst visibility days between the 2010 Base Year and 2010 Typical Year. There also are not substantial differences in the 20th percentile best and worst visibility days between the four future year scenarios.

Results generally show a decrease in deposition values for the 2021 future year scenarios relative to the 2010 Typical Year. However, the differences in estimated deposition values between all four future year scenarios are generally very small. ANC change at all seven sensitive lakes exceeds the 10 percent limit of acceptable change for all model scenarios.

5.2.1 Greenhouse Gas Emissions

Many elements of human society and the environment are sensitive to climate variability and change. Rising average temperatures are already affecting the environment. Some observed changes include shrinking of glaciers, thawing of permafrost, later freezing and earlier break-up of ice on rivers and lakes, lengthening of growing seasons, shifts in plant and animal ranges, and earlier flowering of trees (IPCC 2007).

Global temperatures are expected to continue to rise as human activities continue to add CO_2, methane (CH_4), nitrogen oxides, and other greenhouse gases (GHGs) to the atmosphere. Most of the United States is expected to experience an increase in average temperature (IPCC 2007). Precipitation changes, which are also very important to consider when assessing climate change effects, are more difficult to predict. Whether or not rainfall will increase or decrease remains difficult to forecast for specific regions.

The extent of climate change effects, and whether these effects prove harmful or beneficial, will vary by region, over time, and based on the ability of different societal and environmental systems to adapt to or cope with the change. The Intergovernmental Panel on Climate Change (IPCC) concludes that "impacts of climate change will vary regionally but, aggregated and discounted to the present, they are very likely to impose net annual costs which will increase over time as global temperatures increase" (IPCC 2007). The IPCC estimates that some places and sectors will see beneficial impacts resulting from increases in global mean temperature of less than 1-3°C (1.8-5.4° F) above 1990 levels, while others will experience harmful ones. Some low-latitude and polar regions are expected to experience net costs even with small increases in temperature. For temperature increases greater than 2-3°C (3.6-5.4°F), the IPCC states that it is very likely that all regions will experience either declines in net benefits or increases in net costs. "Taken as a whole," the IPCC concludes, "the range of published evidence indicates that the net damage costs of climate change are likely to be significant and to increase over time."

Table 5.2.6-1 shows global, U.S., and State of Utah anthropogenic GHG emissions pertaining to global warming potential or carbon dioxide equivalents from 1990 through 2020 (USEPA 2013). The data represents all GHGs and all anthropogenic sources of GHGs but does not include sinks of GHGs. The emissions data was compiled from different sources of information that use different methodology and assumptions. As a result, data values for some of the years are not readily available for comparison. It is estimated that global CO_2 emissions have continued to increase about 3 percent per year on average from 2000 through 2012 (CDIAC 2013). Consequently, this same rate of growth was applied to the values in **Table 5.2.6-1** beyond 2004. It should be noted that U.S. GHG emissions have been relatively constant since 2005, while global and State of Utah emissions have increased.

TABLE 5.2.6-1
GLOBAL, U.S. AND UTAH GHG EMISSIONS

Year	Global GHG Emissions [a] (million metric tons CO_2e)	U.S. GHG Emissions [b] (million metric tons CO_2e)	Utah GHG Emissions c (million metric tons CO_2e)
1970	28,700	NA [d]	NA
1980	35,600	NA	NA
1990	39,400	6,175	49

Year	Global GHG Emissions [a] (million metric tons CO_2e)	U.S. GHG Emissions [b] (million metric tons CO_2e)	Utah GHG Emissions c (million metric tons CO_2e)
2000	44,700	7,204	66
2004	49,000	NA	NA
2005	50,500	7,204	69
2006	52,000	7,159	NA
2007	53,500	7,253	NA
2008	55,100	7,048	NA
2009	56,800	6,608	NA
2010	58,500	6,822	76
2020	NA	NA	96

[a] Source: IPCC Fourth Assessment Report: Climate Change 2007, Figure 2.1. (IPCC 2007).
[b] Source: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010 Table ES-2. (USEPA 2012b).
[c] Source: GNB FEIS, Table 4.1-7.
[d] NA = data not readily available from the sources cited.

Climate change analyses are comprised of several factors, including but not limited to GHGs, land use management practices, and the albedo effect. While emissions from oil and gas activities may contribute to the effects of climate change to some extent, it currently is not possible to associate any of these particular actions with the creation of any specific climate-related environmental effects. The tools necessary to quantify climatic impacts of single or a small group of projects are presently unavailable. As a consequence, impact assessments of specific effects of anthropogenic activities cannot be determined. Additionally, specific levels of significance have not yet been established. Therefore, climate change analysis for the purpose of this document focuses on GHG emissions for the proposed project in comparison to global and regional totals.

GHG operational emissions under the Proposed Action (Alternative A) are approximately 3.7 million short tons of carbon dioxide equivalents (CO_2e, see **Section 4.2**), or approximately 3.3 million metric tons CO_2e. These emissions are less than about five hundredths of a percent of the U.S. total shown for 2010 and about 3 percent of the state-wide total projected for 2020.

Under the No Action Alternative (Alternative B), cumulative emissions in the region will continue to increase. The GNB analysis showed that the proposed 3,675-well GNB Project contributed either nothing or a very small percentage to the cumulative air quality impacts. A similar result would be expected for this proposed project. Therefore, the cumulative air quality impacts under Alternative B would be the same or nearly the same as those under the Proposed Action.

Project-related emissions would be substantially less under Alternative C than under the Proposed Action. Therefore, cumulative impacts are also like to be less. However, since the contribution of the Proposed Action to cumulative impacts is relatively small, there would be essentially no difference in cumulative impacts between the Proposed Action and Alternative C.

Project-related emissions would be less under Alternative D than under the Proposed Action, because there would be less initial surface disturbance and hence less construction emissions. Therefore, cumulative impacts would also be less. However, since the contribution of the Proposed Action to cumulative impacts is relatively small, there would be essentially no difference in cumulative impacts between the Proposed Action and Alternative D.

Alternatives A, C, and D include measures to protect air quality resources by incorporating several ACEPMs (see **Section 2.2.12.1**) that are intended to minimize or avoid project-specific and cumulative impacts.

5.3 Geology and Minerals

The CIAA for geology and minerals varies by mineral resource. For impacts to local physiography, topography, bedrock geology, and oil and gas exploration, the CIAA is defined as the MBPA. Cumulative impacts to these resources in the CIAA would primarily occur as a result of oil and gas development, which would deplete recoverable oil and gas from the formations underlying the CIAA and alter local topography due to surface disturbance.

As indicated in **Table 5.3-1,** surface disturbance associated with the implementation of the Proposed Action, the No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally impact local physiography, topography, bedrock geology, and oil and gas exploration, and contribute to increased surface disturbance.

TABLE 5.3-1
SURFACE DISTURBANCE ESTIMATES FOR EXISTING, ONGOING, AND PENDING OIL AND GAS PROJECTS IN THE CIAA FOR GEOLOGY AND MINERALS, PALEONTOLOGICAL RESOURCES, CULTURAL RESOURCES, AND LAND USE & TRANSPORTATION

Project Name	Totals per Project		Totals in CIAA	
	Project Area (acres) [1]	Surface Disturbance (acres) [2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	3,725	100	3,725
Gasco Uinta Basin EIS	206,826	10,302	19.3	1,990
Castle Peak and Eight Mile Flat EIS	65,381	3,701	100	3,701
Total Existing, Operational, and Proposed Projects	**-**	**17,728**	**-**	**9,416**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	16,129	100	16,129
Grand Total (if Proposed Action is selected)	**-**	**33,857**	**-**	**25,545**

Project Name	Totals per Project		Totals in CIAA	
	Project Area (acres) [1]	Surface Disturbance (acres) [2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	870	100	870
Grand Total (if No Action Alternative is selected)	**-**	**18,598**	**-**	**10,286**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	20,112	100	20,112
Grand Total (if Alternative C is selected)	**-**	**37,840**	**-**	**29,528**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	10,122	100	10,122
Grand Total (if Alternative D is selected)	**-**	**27,850**	**-**	**19,538**

[1] Acreage for each project area was compiled from various notices and NEPA documents.
[2] Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

5.3.1 Oil and Gas Exploration, Development, and Production

Oil and gas development has historically been prevalent within the CIAA and is expected to continue its prevalence within the Uinta Basin. Cumulatively, the oil and gas fields within the CIAA have produced over 58 MMbo and 177 MMCF of natural gas as of March 2013 (UDOGM 2013b). A list of cumulative oil and natural gas production by field is presented in **Table 5.3.1-1**.

TABLE 5.3.1-1
CUMULATIVE OIL AND NATURAL GAS PRODUCTION BY FIELD

Production Field	Cumulative Oil Production (bbls[a])	Cumulative Natural Gas Production (Mcf[b])
Castle Peak	63,996	169,286
Monument Butte	56,167,232	127,739,094
Eightmile Flat	524,115	6,702,197
Pariette Bench	1,209,106	42,185,586
Total Production	**57,964,449**	**176,796,163**

[a] barrels
[b] thousand cubic feet

Potential recovery of oil and natural gas resources associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect the amount of oil and gas reserves within the CIAA. As shown in **Table 5.3.1-1**, approximately 58 MMbo and 177 MMCF have already been extracted within the CIAA. Depending on the alternative selected, the total amount of oil and gas resources extracted within the CIAA would be approximately 390 MMbo and 7.4 Tcf of natural gas under Alternative A – Proposed Action; 119 MMbo and 1.2 Tcf of natural gas under Alternative B – No Action Alternative; 390 MMbo and 7.4 Tcf of natural gas under Alternative C – Field-wide Electrification; or 390 MMbo and 7.4 Tcf of natural gas under Alternative D - Agency Preferred Alternative. The continual and increased rate of oil and gas extraction would irreversibly and cumulatively deplete the targeted geologic formations within the CIAA.

5.3.2 Gilsonite

While there are no currently leased or producing Gilsonite veins within the MBPA, increased oil and gas facility density within the CIAA could preclude the future leasing of the six mapped Gilsonite veins within the area for the LOP. The Vernal Mineral Potential Report (MPR) projects 10 leases within the VFO jurisdiction within the next 15 years, but it cannot predict the number of new mines that would be developed by lessees within the CIAA.

5.3.3 Tar Sands

The CIAA for tar sands are all STSAs located entirely or partially within the MBPA, comprising approximately 19,530 acres. Surface and subsurface disturbance of STSAs could impede the extraction of tar sands in those areas. High production costs of tar sands, along with current oil and gas prices, are making the extraction of oil from bituminous tar sands economically infeasible. Currently, Uintah County uses tar sands that are found in the area for asphalt, although the material originates from a private source. According to the *Approved Land Use Plan Amendments/Record of Decision for Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the Bureau of Land Management in Colorado, Utah and Wyoming and Final Programmatic Environmental Impact Statement* (LUPA), tar sand resources are not a proven commercially viable energy source (BLM 2013). The LUPA concluded that additional analysis of the environmental consequences of tar sand development is necessary before initiating broad-scale commercial development. Therefore, cumulative impacts to the development of tar sands by the Proposed Action or alternatives are expected to be minimal. **Table 5.3.3-1** summarizes surface disturbance estimates for tar sands.

TABLE 5.3.3-1
SURFACE DISTURBANCE ESTIMATES FOR IMPACTS TO SPECIAL TAR SANDS AREAS FROM EXISTING, ONGOING, AND PENDING OIL AND GAS PROJECTS IN THE CIAA

Project Name	Totals in CIAA			
	Project Area (acres) [1]	Surface Disturbance (acres) [2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	3,725	11.9	443
Gasco Uinta Basin EIS	206,826	10,302	0	0

Project Name	Totals in CIAA			
	Project Area (acres) [1]	Surface Disturbance (acres) [2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Castle Peak and Eight Mile Flat EIS	65,381	3,701	14.0	518
Total Existing, Operational, and Proposed Projects	**-**	**17,728**		**961**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	16,129	11.9	1,919
Grand Total (if Proposed Action is selected)	**-**	**33,857**		**2,881**
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	870	11.9	104
Grand Total (if No Action Alternative is selected)	**-**	**18,598**		**1,065**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	20,112	11.9	2,393
Grand Total (if Alternative C is selected)	**-**	**37,840**		**3,355**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	10,122	11.9	1,205
Grand Total (if Alternative D is selected)	**-**	**27,850**		**2,166**

[1] Acreage for each project area was compiled from various notices and NEPA documents.
[2] Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

5.3.4 Oil Shale

The CIAA for oil shale resources are all KOSLAs located entirely or partially within the MBPA, comprising approximately 444,958 acres. The current price of oil and levels of extraction technology are preventing oil shale from becoming an economically viable source of oil and gas. Under the LUPA, areas allocated as open for future oil shale leasing are open only to research, development, and demonstration (RD&D) leases (BLM 2013). The BLM would issue a commercial lease only when a lessee satisfies the conditions of its RD&D lease and the regulations in the CFR. Therefore, cumulative impacts to the development of oil shale by the Proposed Action and alternatives are expected to be minimal. **Table 5.3.4-1** summarizes the surface disturbance for oil shale resources.

TABLE 5.3.4-1
SURFACE DISTURBANCE ESTIMATES FOR IMPACTS TO KNOWN OIL SHALE LEASE AREAS FROM EXISTING, ONGOING, AND PENDING OIL AND GAS PROJECTS IN THE CIAA

Project Name	Totals in CIAA			
	Project Area (acres) [1]	Surface Disturbance (acres) [2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	3,725	20.8	775
Gasco Uinta Basin EIS	206,826	10,302	13.4	1,381
Castle Peak and Eight Mile Flat EIS	65,381	3,701	29.3	1,084
Total Existing, Operational, and Proposed Projects	**-**	**17,728**		**3,240**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	16,129	20.8	3,355
Grand Total (if Proposed Action is selected)	**-**	**33,857**		**6,595**
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	870	20.8	181
Grand Total (if No Action Alternative is selected)	**-**	**18,598**		**3,421**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	20,112	20.8	4,183
Grand Total (if Alternative C is selected)	**-**	**37,840**		**7,423**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	10,122	20.8	2,105
Grand Total (if Alternative D is selected)	**-**	**27,850**		**5,345**

[1] Acreage for each project area was compiled from various notices and NEPA documents.

[2] Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

5.3.5 Other Leasable, Locatable, and Salable Minerals

For other leasable, locatable, and salable minerals, the CIAA is the MBPA. Oil and gas development within the MBPA would increase the density and quantity of surface disturbance within the CIAA. Because mineral resources within the MBPA are recovered through the surface, disturbance associated with oil and gas activity would prevent the recovery of other mineral resources within the MBPA. For example, sand and gravel pits are currently in operation within the MBPA. While the Proposed Action and alternatives are not likely to impact existing sand and gravel operations within the CIAA, they may prevent future extraction of these resources. Up to six new gravel pits are anticipated within the Uinta Basin, with a possibility that one or more gravel pits could occur in the CIAA due to its proximity to the Green River and its ephemeral drainages (BLM 2002a).

Locatable uranium is the only known mineral to exist in the formations underlying the CIAA. Because there are no mining claims to these locatable minerals within the CIAA, there would be no impact to these resources. Additionally, there is a low potential for new mining claims to be issued in the foreseeable future, because the geology of the area is not well suited for economic development of locatable mineral deposits (BLM 2002a).

5.4 Paleontological Resources

The CIAA for paleontological resources is defined as the MBPA and surrounding region for related paleontological resources. The severity of cumulative impacts to paleontological resources is dependent on the paleontological site density that is present near project-related activity, the relative importance of the paleontological resources that are present, and the final magnitude of the reasonably foreseeable operations over the next 20 years. While the magnitude of damage to paleontological sources relies on these factors, it is important to remember that damage to or destruction of these resources is generally site-specific and not additive across a landscape.

Impacts to paleontological resources within the CIAA could result from past, present, and reasonably foreseeable actions that cause surface and subsurface disturbance to fossiliferous rocks from oil and gas development. Such activity could damage or destroy fossils or formations that house fossils. If damage occurs as a result of these actions, fossils could be irreversibly and irretrievably removed from the paleontological information base and would no longer be available for analysis. In addition to the loss of paleontological resources from damage and destruction, the increased human exposure from improved vehicle and pedestrian access may increase loss of fossils due to theft and vandalism.

Cumulative surface disturbance by alternative is shown in **Table 5.3-1.** Specific direct impacts to presently unknown paleontological resources in the CIAA as a result of the alternatives and other reasonably foreseeable actions would be unknown until paleontological surveys are completed for all areas of proposed surface disturbance. However, for surface-disturbing activities located on previously disturbed sites, fossil resources would not be directly affected. While the potential for impacts to fossils would likely increase within the CIAA due to the surface disturbance of the Proposed Action and alternatives, these impacts can be reduced through the preparation and execution of the mitigation measures detailed in the ACEPMs. (See **Section 2.2.11.**)

Although paleontological sites within the disturbance areas would be avoided or mitigated, sites outside of and adjacent to surface-disturbing areas are vulnerable to indirect impacts. Ground-disturbing actions (including soil compaction and/or fracturing of surface or fossiliferous bedrock), increased pedestrian and vehicle traffic during project construction and operation, as well as past, present, and reasonably foreseeable oil and gas projects, could cumulatively affect unknown paleontological resources within the CIAA. These changes could lead not only to increased instances of illegal collection and vandalism of fossils, but also to increased damage from dust and erosion at sites within the vicinity of well pads, pipelines, and roads where vegetation cover has been removed or cleared. All of these indirect impacts would incrementally and cumulatively add to the loss of scientifically important fossils within the CIAA. Such losses would influence the breadth, integrity, and value of the paleontological record.

Surface-disturbing activities within the CIAA also have beneficial impacts to paleontological resources and fossil recovery. The total area surveyed within the CIAA would increase, because each surface-disturbing site would be surveyed by a qualified paleontologist prior to construction. Increased research at these sites may lead to the collection of specimens and other data that otherwise would have not been recovered.

Under the No Action Alternative, paleontological resources would be protected by site-specific mitigation measures on a well-by-well basis as a part of the APD process. Under Alternatives C and D, impacts would be similar to those of the Proposed Action, but they would vary in scope and severity based on the amount of proposed surface disturbance in previously undisturbed areas. Alternatives A, C, and D include measures to protect paleontological resources by incorporating several ACEPMs (see **Section 2.2.12.2**) that are intended to minimize or avoid project-specific and cumulative impacts. In addition, many potential cumulative impacts to paleontological resources would be reduced or eliminated for all alternatives through the implementation of Federal regulatory laws, actions, and guidelines, as well as coordination with the appropriate SMA.

5.5 Soil Resources

The CIAA for soil resources is defined as all of the watersheds[1] that are contained within or intersect the MBPA. Any surface-disturbing activity that removes native vegetation and topsoil from these watersheds may cumulatively and incrementally affect soils by increasing erosion and sediment yield, which in turn would reduce soil productivity and stability as measured by the amounts and types of vegetative cover and forage. In addition, oil and gas exploration and production operations have the potential to release drilling fluids and other petroleum products to the ground surface, resulting in the contamination of soil resources. Past, present, and reasonably foreseeable actions that could result in increased erosion, sediment yield, and soil contamination within the CIAA include oil and gas exploration and development, forage use for livestock grazing and wildlife recreation, mining activities, public land use and recreation, and county and private road construction.

As shown in **Table 5.5-1,** surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, when added to past, present, and other reasonably foreseeable actions, would cumulatively and incrementally affect soil resources across the CIAA.

[1] Drainages within the CIAA include the Castle Peak Draw, Desert Spring Wash, Gilsonite Draw, Kings Canyon-Green River, Lower Big Wash, Lower Pleasant Valley Wash, Lower Wells Draw, Outlet Pariette Draw, Pariette Bench, Sheep Wash, Upper Big Wash, Upper Pleasant Valley Wash, Upper South Myton Bench, Upper Wells Draw, and the Uteland Butte Wash.

TABLE 5.5-1
SURFACE DISTURBANCE ESTIMATES FOR EXISTING, ONGOING, AND PENDING OIL AND GAS PROJECTS IN THE CIAA FOR SOIL RESOURCES, WATER RESOURCES, VEGETATION, FISH & WILDLIFE, AND SPECIAL STATUS PLANT, FISH & WILDLIFE SPECIES (EXCLUDING UINTA BASIN HOOKLESS CACTUS AND PARIETTE CACTUS)

Project Name	Totals in CIAA			
	Project Area (acres) [1]	Surface Disturbance (acres) [2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	3,725	100	3,725
Gasco Uinta Basin EIS	206,826	10,302	70.4	7,253
XTO Kings Canyon EA	44,637	1,131	45.6	516
XTO River Bend Unit EA	16,719	1,075	3	32
EOG North Alger II EA	2,390	110	100	110
KMG Greater Natural Buttes EIS	162,848	12,658	1.5	190
Castle Peak and Eight Mile Flat EIS	65,381	3,701	100	3,701
Newfield EDA #1 EA	77,647	2,494	87.5	2,182
Rocky Point EDA EA	92,098	345	26.1	90
Ouray Field EA	10,759	835	1.1	9
Randlett EDA EA	53,380	2,613	27.4	716
Total Existing, Operational, and Proposed Projects	**-**	**38,989**	**-**	**18,524**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	16,129	100	16,129
Grand Total (if Proposed Action is selected)	**-**	**55,118**	**-**	**34,653**
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	870	100	870
Grand Total (if No Action Alternative is selected)	**-**	**39,859**	**-**	**19,394**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	20,122	100	20,122
Grand Total (if Alternative C is selected)	**-**	**59,111**	**-**	**38,646**

Project Name	Totals in CIAA			
	Project Area (acres) [1]	Surface Disturbance (acres) [2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is Selected)	119,743	10,122	100	10,122
Grand Total (If Alternative D is selected)	**-**	**49,111**	**-**	**28,646**

[1] Acreage for each project area was compiled from various notices and NEPA documents.

[2] Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

Note: Drainages within the CIAA include the Castle Peak Draw, Desert Spring Wash, Gilsonite Draw, Kings Canyon-Green River, Lower Big Wash, Lower Pleasant Valley Wash, Lower Wells Draw, Outlet Pariette Draw, Pariette Bench, Sheep Wash, Upper Big Wash, Upper Pleasant Valley Wash, Upper South Myton Bench, Upper Wells Draw, and the Uteland Butte Wash.

Cumulative impacts to soils from surface disturbance for past, present, and reasonably foreseeable projects within the CIAA are projected to be 18,524 acres (**Table 5.5-1**). Under the Proposed Action, approximately 16,129 acres of new disturbance would increase the total past, present, and future surface disturbance within the CIAA to approximately 34,653 acres – an 87 percent increase. Under Alternatives B, C, and D, cumulative surface disturbance within the CIAA would increase to approximately 19,394 acres (5 percent); 38,646 acres (109 percent); and 28,646 acres (55 percent), respectively.

Cumulative impacts to soils from the surface release of drilling and production fluids during exploration and production activities would be largely localized to the area immediately surrounding the wells and storage tanks, with additional potential within pipeline ROWs and along access roads. Similar to the impacts to BSC communities, the degree of soil contamination is assumed to be correlated to the number of wells as well as the extent and type of infrastructure under each alternative. However, while the greatest amount of surface disturbance would occur under Alternative C, the electrification of the MBPA would result in the reduction of gas-fired engines initially installed to power operational field equipment, and therefore a reduction in the amount of surface soil contamination associated with emissions from the engines. Therefore, the greatest incremental contribution to cumulative surface soil contamination would occur under Alternative A, and the lowest relative impact would occur under the No Action Alternative.

The current soil loss from oil and gas activities in the CIAA is estimated at approximately 183 tons per year. Soil erosion resulting from the Proposed Action would increase the projected total soil loss across the CIAA by about 254 tons annually. Similarly, implementation of Alternatives B, C, or D would contribute to annual soil loss within the CIAA by approximately 193 tons, 254 tons, and 251 tons, respectively.

In addition to oil and gas development activities, other activities which may increase soil erosion in the CIAA include grazing, recreation, and road construction. Grazing and other agricultural activities contribute to the loss of vegetation that could impair soil function through diminished ability of the soils to recycle nutrients and regulate water. The new roads would increase access throughout the CIAA, possibly providing new access opportunities for recreationists. Although road densities contribute to the magnitude of erosion, construction of all-weather roads could reduce sediment loss.

Additionally, ground disturbing activities could remove valuable BSCs from the CIAA. Under each alternative, pinyon-juniper woodlands and sagebrush communities (both of which are associated with BSCs) would be disturbed as a result of project activities. Since BSC communities recolonize and regrow very slowly following disturbance, the soil stabilization, nitrogen fixing, and carbon-fixing benefits of soil crusts may take as long as 250 years to become fully re-established. The degree of removal of BSCs would be directly correlated to the amount of surface disturbance under each alternative. Therefore, the greatest incremental contribution to the cumulative loss of BSCs would occur under Alternative C, and the lowest relative impact would occur under the No Action Alternative.

Under all alternatives, soil resources would be protected by site-specific mitigation measures on a well-by-well basis as part of the APD approval process. Alternatives A, C, and D include measures to protect soil resources by incorporating several ACEPMs (see **Section 2.2.12.3**) that are intended to minimize or avoid project-specific and cumulative impacts.

5.6 Water Resources

The CIAA for water resources, including floodplains, is defined as the Pariette Draw (Upper and Lower), Sheep Wash-Green River, and the Antelope Creek-Duchesne River watersheds within the MBPA. This CIAA considers impacts to water resources that are collectively affected by ongoing resource management and energy development in this region. Oil and gas development typically includes the construction of well pads, pipelines, roads, compressor stations, power lines, and other facilities. These land disturbing activities can result in increased sedimentation, water runoff, and surface and ground water quality degradation. Potential direct and indirect impacts to surface water resources may include surface water depletion and surface water degradation from hazardous material spills, sediment, salinity, and selenium. Any surface-disturbing activity that removes native vegetation and topsoil from these watersheds may cumulatively and incrementally affect water resources by increasing erosion and sediment yield to area drainages and surface water features. Past, present, and reasonably foreseeable actions that could result in increased erosion and sediment yield within the CIAA include oil and gas development, forage use for livestock grazing and wildlife, recreation, mining activities, and county and private road use and construction.

As shown in **Table 5.5-1,** surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect sediment yield across the CIAA.

The current estimated sediment yield from oil and gas activities in the CIAA is approximately 25 tons per year. Sediment yield resulting from the Proposed Action would increase the projected total sediment yield across the CIAA by approximately 32 tons per year during the production phase. Under Alternatives B, C, and D, the annual sediment yield during the production phase would increase by 27 tons, 32 tons, and 34 tons, respectively. Disturbance would last for the duration of oil and gas development and production, until such time that reclamation has proven successful. Factors such as drought, reclamation requirements, and other known and unknown factors may affect the success of reclamation within the CIAA.

Additional drilling and production activities in the MBPA could result in cumulative adverse impacts to usable groundwater aquifers. Based on available data, fresh water resources are relatively shallow and of limited extent in the MBPA; however, there is the potential for impacts to these resources resulting from drilling activities, including improper well completion, water-flooding, disposal wells, and hydraulic fracturing. Drilling techniques are designed to isolate the upper portion of the aquifer system from the lower levels where drilling activities occur and protect these water zones.

The casing and cementing program would be designed to isolate and protect the shallower formations encountered in the wellbore and to prohibit pressure communication or fluid migration between different formations. In addition, the cement would protect the well by preventing formation pressure from damaging the casing and by minimizing contact between the casing and formation to retard corrosion. Groundwater zones would be protected by cementing the surface casing to the ground surface and by bringing the cement for the production or intermediate casing to at least 200 feet above the surface casing shoe. As a result of the well bore casing and cementing program, the project is not expected to contribute to cumulative effects on groundwater aquifers.

The alternatives would use a minor amount of surface water, compared to the amounts used by agriculture and the total amount available. However, water for agricultural use is typically returned to the stream, except for losses due to evaporation and infiltration. Any water used for oil and gas production would be secured from existing water sources appropriated for industrial or oil and gas use (refer to **Table 2.2.8-1**) or the proposed water collector well.

It is expected that surface waters in the CIAA would experience increased erosion and sediment transport from activities related to oil and gas development, such as new roads, increased road traffic, well pads, and other land disturbance activities. These effects, when combined with increased erosion from other authorized actions, could have negative impacts on aquatic habitat within affected drainages. These impacts include increased turbidity and salinity; the covering of stream substrates with fine sediment and clogging of the interstitial pores of the substrate; increased transport of pollutants, including trace metals, herbicides, and petroleum constituents; and increased down-cutting of the channel and bank destabilization. The construction and operation of each well would also incrementally increase the potential for leaks or spills of saline water, hydro-fracturing chemicals, fuels, and lubricants to occur within the CIAA. Spills of this nature could contaminate surface water within the area.

Under all alternatives, water resources would be protected by site-specific mitigation measures on a well-by-well basis as part of the APD approval process, using Instruction Memorandum (IM) No. UT 2010-055. Alternatives A, C, and D include measures to protect water resources by incorporating several ACEPMs (see **Section 2.2.12.4**) that are intended to minimize or avoid project-specific and cumulative impacts.

5.7 Vegetation

5.7.1 General Vegetation

The CIAA for vegetation is defined as all of the watersheds that are contained within or intersect the MBPA. All surface-disturbing activities that involve removing native vegetation and/or topsoil from these watersheds may cumulatively and incrementally affect vegetation by fragmenting communities and increasing competition with noxious and invasive weeds. Habitat fragmentation as a result of surface-disturbing activities can have many negative impacts on native plant species. Impacts from fragmentation could include the isolation of small populations, decreases in species density, increased pressure from grazing, increased competition, introduction of noxious weed species, and decreased pollination.

Surface-disturbing activities may compact or destabilize soil, causing an increase in soil erosion and sediment yield. These effects would lead to increases in fugitive dust that may adversely affect vegetative communities. Other cumulative impacts associated with the removal of vegetation resources within the CIAA include losses of species biodiversity, agricultural lands, wildlife forage and habitat, and available forage for livestock grazing operations. Such changes to the landscape may decrease plant productivity and composition within the CIAA. Past, present, and reasonably foreseeable actions and activities within the

CIAA that may contribute to negative effects on vegetation communities include oil and gas development, mining activities, forage use by wildlife and cattle, conversion of agricultural lands, recreation, and county and private road construction.

As shown in **Table 5.5-1,** surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect the vegetation communities across the CIAA. Approximately 18,524 acres of land within the CIAA has been or would be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to vegetation within the CIAA would increase to approximately 34,653 acres (87 percent) under Alternative A – Proposed Action; 19,394 acres (5 percent) under Alternative B – No Action Alternative; 38,646 (109 percent) under Alternative C – Field-wide Electrification; or 28,646 acres (55 percent) under Alternative D - Agency Preferred Alternative. Surface disturbance and reduced productivity would last for the duration of oil and gas development and production, until such time that reclamation has proven successful. Application of an adaptive management approach to reclamation, including a regular monitoring program over the LOP, would provide important information on the relative success of applied interim and long-term reclamation actions. This approach also could minimize the effects of drought, as well as other known and unknown factors that may affect the success of reclamation within the CIAA.

Under all alternatives, vegetation resources would be protected by site-specific mitigation measures on a well-by-well basis as part of the APD approval process. Alternatives A, C, and D include measures to protect vegetation resources by incorporating several ACEPMs (see **Section 2.2.12.5**) that are intended to minimize or avoid project-specific and cumulative impacts. In addition, interim and final reclamation, in aggregate with mitigation measures such as noxious weed management, erosion control and topsoil stockpiling, would reduce the impacts associated with vegetation communities by decreasing soil erosion, minimizing fragmentation and reducing the opportunity for introduction and competition with invasive and noxious weed species.

5.7.2 Invasive and Noxious Weeds

Any surface-disturbing activity that removes native vegetation and topsoil from these watersheds may cumulatively and incrementally contribute to the introduction and spread of invasive and noxious weeds. Negative impacts associated with the introduction and presence of noxious weeds include:

- A reduction in the overall visual character of the area affected;
- Competition with and possible elimination of native plants;
- A reduction in the overall value of forage for wildlife and livestock;
- Fragmentation of available forage for wildlife and livestock; and
- Increased soil erosion.

Increased disturbance and presence of noxious weeds may be a result of their introduction to a previously uninhabited area or increased size and density within an already inhabited area. These impacts would be most prevalent along road corridors, which undergo frequent activity and disturbance and are often a conduit for the spread of noxious weeds into previously uninhabited areas.

The potential for the invasion and establishment of noxious weed species would be directly proportional to the amount of surface disturbance associated with each alternative. As shown in **Table 5.5-1,** surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable oil and gas development would cumulatively and incrementally increase the potential for the invasion and establishment of noxious weeds across the CIAA. Depending on the alternative selected, the potential for impacts from invasive and noxious weed species would be highest for Alternatives A and C and lowest for Alternatives B and D. Factors such as drought, overall reclamation success, and other known and unknown factors may affect the severity of impacts from invasive and noxious weed species within the CIAA.

5.8 Range Resources

The CIAA for range resources is defined as the six grazing allotments that are contained within or intersect the MBPA. Cumulative impacts to range resources as a result of oil and gas development may include direct loss of usable acres during the life of development and operations. Other activities that contribute incremental and cumulative impacts and loss of usable acres within the CIAA are mining activities, recreational activities, and prescribed burns. However, the incremental contribution of these activities is infeasible to quantify.

As shown in **Table 5.8-1,** surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect range resources across the CIAA. Approximately 9,386 acres of land within the MBPA related to range resources have been or could be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to range resources within the CIAA could be up to 25,694 acres (the maximum under Alternative C).

TABLE 5.8-1
SURFACE DISTURBANCE ESTIMATES FOR EXISTING, ONGOING, AND PENDING OIL AND GAS PROJECTS IN THE CIAA FOR RANGE RESOURCES

Project Name	Totals in CIAA			
	Project Area (acres) [1]	Surface Disturbance (acres) [2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	8,798	100	3,284
Gasco Uinta Basin EIS	206,826	3,604	60.0	2,163
XTO Kings Canyon EA	44,637	1,131	21.0	238
Castle Peak Eight Mile Flat EIS	65,381	3,701	100	3,701
Total Existing, Operational, and Proposed Projects	**-**	**17,234**	**-**	**9,386**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	16,129	100	16,129
Grand Total (if Proposed Action is selected)	**-**	**33,363**	**-**	**25,515**
Newfield's Greater Monument Butte Oil & Gas Development	119,743	870	100	1,335

Project Name	Totals in CIAA			
	Project Area (acres)[1]	Surface Disturbance (acres)[2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Project (if No Action Alternative is selected)				
Grand Total (if No Action Alternative is selected)	**-**	**18,104**	**-**	**10,721**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	16,308	100	16,308
Grand Total (if Alternative C is selected)	**-**	**33,542**	**-**	**25,694**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	9,805	100	9,805
Grand Total (if Alternative D is selected)	**-**	**27,039**	**-**	**19,191**

[1] Acreage for each project area was compiled from various notices and NEPA documents.
[2] Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline and any additional structures associated with oil and gas production. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well (BLM 2012a)).

In addition to loss of usable forage, increased access road development within the MBPA could incrementally and cumulatively contribute to difficulties in controlling livestock, because more natural barriers to movement may be removed and more livestock could use roads as travel routes. Range facilities such as water sources, fences, cattle guards, and corrals could be damaged as a result of oil and gas construction and operation activities within the CIAA. Conversely, road development may benefit livestock grazing, because it can assist in moving cattle from one allotment to another and may allow cattle to access portions of an allotment that were previously inaccessible due to geographic limitations, distance from water, or a combination of both. Increased road quantity, vehicle traffic, and livestock use may increase the probability and occurrence of vehicle/cattle collisions. Furthermore, increased competition for available forage may result if allocated AUMs are not decreased according to loss of forage from increased construction activities.

Other impacts to range resources that may cumulatively affect livestock within the CIAA include decreased flows to livestock ponds as a result of changes in water flow regimes from construction activities, and increased displacement resulting from vegetation loss, human activity, and traffic. Livestock will typically move into adjacent undisturbed areas if displaced; as a result, additional impacts may occur in these locations.

Under all alternatives, range resources would be protected by site-specific mitigation measures on a well-by-well basis as a part of the APD process. In addition, impacts to rangelands would be minimized as follows:

- Adherence to the Utah BLM Rangeland Health Standards, as required by the Vernal RMP (BLM 2008b);
- Reclamation of surface disturbance associated with the proposed project;

- Implementation of alternatives in accordance with the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a) and;
- Implementation of Newfield's Weed Control Plan (see **Section 2.2.12.5**).

ACEPMs detailed in **Section 2.2.12.6** would also ensure management of livestock while on their allotments.

5.9 Fish and Wildlife

The CIAA for fish is defined as the spatial boundary of all the watersheds that are contained within or intersect the MBPA. The CIAA for terrestrial wildlife is defined as the species-specific habitats within the watersheds that are contained within or intersect the MBPA (refer to **Table 5.1-1**). The cumulative impact analysis is centralized around the regional wildlife resources and how these species within the designated watersheds may be susceptible to the impacts of this Project in conjunction with existing and foreseeable conditions. This analysis assumes that (1) human use of the CIAA would increase with the implementation of the proposed project; and (2) the overall region has been previously impacted by past and present (existing and ongoing) oil and gas activity and other land uses.

Past, present, and reasonably foreseeable surface disturbance resulting from oil and gas activity within the CIAA will continue to reduce and fragment wildlife habitat, disrupt seasonal patterns and migration routes, displace individual wildlife species, increase the potential for vehicle and wildlife collisions, and potentially contribute to harassment and poaching of wildlife species. Other permitted activities that may contribute to the cumulative impacts to wildlife are livestock grazing, mining activities, and recreational activities. However, the contribution of these other activities to the overall cumulative impacts on wildlife is difficult to quantify. As such, this analysis will assume that all future disturbances within the CIAA would primarily result from surface-disturbing activities related to oil and gas development. Although this analysis is limited to oil and gas activity, it is understood that activities such as grazing, recreation, subsequent development of dedicated recreational facilities, and continued growth of communities within the CIAA may also remove habitat from use by or otherwise disturb wildlife.

As shown in **Table 5.5-1,** surface disturbance associated with the implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect wildlife habitat across the CIAA. Approximately 18,524 acres of land within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to lands within the CIAA would increase to approximately 34,653 acres (87 percent) under Alternative A – Proposed Action; 19,394 acres (5 percent) under Alternative B – No Action Alternative; 38,646 (109 percent) under Alternative C – Field-wide Electrification; or 28,646 acres (55 percent) under Alternative D - Agency Preferred Alternative. Disturbance would last for the duration of oil and gas development and production, until such time that reclamation has proven successful.

Big game (especially pronghorn antelope) would be most susceptible to cumulative impacts, because past disturbance associated with oil and gas development has resulted in a substantial increase in the amount of habitat loss, habitat fragmentation, and displacement to pronghorn in UDWR-designated seasonal ranges (e.g., year-long crucial fawning habitat or year-long substantial habitat). Other wildlife species, such as raptors and migratory birds, also would be susceptible to cumulative impacts, since encroaching human activities in the region have resulted in, or could result in, habitat loss and fragmentation and animal displacement in areas that may be at their relative carrying capacity for these resident species. Many of the local wildlife populations (e.g., general wildlife or upland game) within the CIAA would likely continue to occupy their respective ranges and breed successfully, although population numbers may decrease relative to the amount of cumulative habitat loss and disturbance from incremental development.

While surface disturbance corresponds directly to associated wildlife impacts, quantification of these cumulative impacts cannot be accurately determined as direct impacts are species specific and depend on a number of factors, including (1) status and condition of the population or individual animals affected; (2) quality of habitats present in the Project Area; (3) seasonal timing of disturbance; (4) type of surface disturbance; and (5) physical parameters of the affected and nearby habitats (e.g. topographical relief and vegetative cover). On federal lands, surveys are required in potential or known habitats of threatened, endangered, or other special status species prior to project implementation. These surveys would help determine the presence of any special status wildlife species or extent of habitat. Furthermore, protective measures would generally be taken to avoid or minimize direct disturbance in these areas. A list of ACEPMs with respect to fish and wildlife species is presented in **Section 2.2.12.7**.

5.10 SPECIAL STATUS SPECIES AND STATE SPECIES OF CONCERN

The CIAA for special status plant, fish and wildlife species (including those listed as threatened or endangered under the ESA, as amended; BLM sensitive species; species proposed for listing; species of special concern; other USFWS or BLM species identified as unique or rare; other UDWR or UNHP species designated as unique or rare and excluding Uinta Basin hookless cactus and Pariette cactus) is defined as the spatial boundary all the watersheds that are contained within or intersect the MBPA. (Refer to **Table 5.1-1.**)

5.10.1 Special Status Fish and Wildlife Species and State Species of Concern

Cumulative impacts to special status fish and wildlife species and state species of concern would be similar to those discussed in **Section 5.9** for general fish and wildlife, but on a much larger scale. Given ongoing habitat loss and sensitivity to disturbance, special status species would likely be more susceptible to the impacts associated with oil and gas development when combined with other past, present, and reasonably foreseeable actions. However, on BLM-managed lands, surveys are typically required in areas where there are potential or known habitats of threatened, endangered, or other special designation species. These surveys would help determine the presence of any special status fish and wildlife species or the extent of their habitat. Protective measures generally would be taken for any BLM-approved activities to avoid or minimize direct disturbance in these crucial areas. Given the status of the Uinta Basin hookless cactus, Pariette cactus, and Colorado River endangered fish species, cumulative impacts for these species may be more pronounced than those for other special status plant, fish, and wildlife species.

5.10.1.1 Colorado River Fish Species, Including Colorado Pikeminnow, Razorback Sucker, Humpback Chub, Bonytail Chub, Bluehead Sucker, Flannelmouth Sucker, and Roundtail Chub

The Colorado River fish species (i.e., Colorado pikeminnow, razorback sucker, humpback chub, bonytail chub, bluehead sucker, flannelmouth sucker, and roundtail chub) would be impacted by activities that deplete or degrade the flow of downstream waters of the Upper Colorado River Basin. Portions of the Green River that occur within the CIAA provide habitat elements required by the Colorado River endangered fish. Cumulative impacts associated with the Proposed Action and other alternatives, in combination with impacts linked with other oil and gas development, livestock grazing, recreational activities, wildlife habitat management, and other land uses within the CIAA, would cumulatively reduce the quality and quantity of aquatic habitat for Colorado River endangered fish species.

Implementation of the alternatives, combined with other past, present, and reasonably foreseeable activities in the CIAA, could also adversely affect designated critical habitat for the Colorado River fish in the Green River by increasing erosion and sediment yield. Increased sediment loading from surface-disturbing activities could lead to slightly higher temperatures in Pariette Draw, which could have an adverse cumulative effect on fisheries and other aquatic species. Sediment deposition may bury and suffocate fish eggs and larvae, which may affect spawning and rearing. In addition, reduced visibility created by sediment loading may inhibit the ability of fish to see prey, which could impact feeding behavior (USEPA 2003). Physiological impacts, such as gill clogging and the ingestion of large quantities of sediment, could cause illness, reduced growth, and eventual death (USEPA 2003). Due to existing surface disturbance, ongoing projects, and poor reclamation success of previously disturbed areas within the MBPA and surrounding region, increased cumulative erosion and subsequent sediment yield would likely occur within these watersheds.

The total annual sediment yield is as follows: Existing Condition 24.9 tons/year; Construction and Development tons/year - Alternative A 62.2, Alternative B 52.6, Alternative C 62.2, and Alternative D 66.4; and Production tons/year – Alternative A 32.1, Alternative B 26.2, Alternative C 32.1, and Alternative D 34.1 (Appendix F). Annual sediment loading in the Green River at Ouray, Utah, is estimated at 6.8 million tons. Annual sediment loading in the Green River at Ouray, Utah, is estimated at 6.8 million tons. Therefore, implementation of the Proposed Action or Alternatives B, C, or D would contribute to this total by a fraction of a percent, which would be considered negligible from a hydrologic standpoint. However, in the context of cumulative effects, the sediment loading contributions from this project, when combined with other oil and gas projects, livestock grazing, wildlife habitat management, and recreational activities, have a potential to substantially increase sediment loading in the Green River.

Colorado River fish species are also affected by activities that deplete the flow of downstream waters into the Upper Colorado River Basin (USFWS 1987). Depletion from the proposed project, combined with depletions from other oil and gas projects, ranching, commercial, and residential water use, has the potential to substantially reduce flow in the Upper Colorado River Basin. In addition to reducing the quantity of water with sufficient quality in a specific location, water depletions can also reduce a river's ability to create and maintain the physical habitat (areas inhabited by, or potentially inhabitable by, special status fish for use in spawning, nursery, feeding, and rearing, or access to these habitats) and the biological environment (food supply, predation, and competition).

The direct withdrawal of water from the Green River for drilling, dust abatement, water-flooding, ranching, commercial water use, and residential water use could also increase the potential to impinge fish on intake screens. In addition, the increased potential for release of natural gas condensate, hydrocarbons, or other toxic substances into the Green River or its tributaries from this project or other past, present, and reasonably foreseeable activities may cause direct mortality of individual fish.

5.10.1.2 Western Yellow-billed Cuckoo and Lewis's Woodpecker

Cumulative impacts to the WYBC and Lewis's woodpecker, if present within the CIAA, could occur as a result of long-term surface disturbance of Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation, which serves as potential nesting and foraging habitat for these species. Oil and gas development, livestock grazing, and recreational activities that occur during the breeding season for these species (March through July) can lead to direct impacts such as the loss of nests, eggs, or young, or the disruption of breeding activities for that season.

As shown in **Table 5.5-1,** surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect the vegetation communities across the CIAA. Approximately 18,524 acres of land within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. It is unknown what percentage of this total is Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation. Similarly, it is difficult to quantify past, present and reasonably foreseeable surface disturbance impacts from other land uses such as livestock grazing and recreation. Nevertheless, the incremental contribution of the proposed project to the total surface disturbance of Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation within the CIAA would range from a low of one (1) acre under Alternatives B and D to a high of 27 acres under the Proposed Action and Alternative C. While these surface disturbance acreages are relatively low, they must be considered as contributions to cumulative impacts on these species.

5.10.1.3 Raptor Species, Including the Bald Eagle, Golden Eagle, Ferruginous Hawk, Short-eared Owl, and Burrowing Owl

Cumulative impacts to special status raptor species, including the bald eagle, golden eagle, ferruginous hawk, short-eared owl, and burrowing owl would be similar to those identified and assessed in **Section 4.9.1.1.6** for raptors. Impacts from implementation of the proposed project, combined with other past, present, and reasonably foreseeable actions, could include displacement caused by increased human activity, nest desertions and/or reproductive failure caused by project-related disturbances, increased public access and subsequent human disturbance resulting from new road construction, and temporary reductions in prey populations due to habitat fragmentation and alteration.

As shown in **Table 5.1-1,** surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect the vegetation communities across the CIAA. Approximately 18,524 acres of potential habitat for prey species (e.g., ground squirrels, prairie dogs, and rabbits) within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to potential habitat for prey species within the CIAA would increase to approximately 34,653 acres (87 percent) under Alternative A – Proposed Action; 19,394 acres (5 percent) under Alternative B – No Action Alternative; 38,646 (109 percent) under Alternative C – Field-wide Electrification; or 28,646 acres (55 percent) under Alternative D - Agency Preferred Alternative.

Data from past raptor inventories conducted within the region from the period of 1995 to 2008 were used to evaluate the level of nesting activity for special status raptor species within the CIAA (BLM 2009). At the time the data were collected, the results identified a total of 231 special status raptor nests within the CIAA, of which 125 were golden eagles, 93 were ferruginous hawks, 12 were burrowing owls, and one was a short-eared owl.

It is unknown what amount of surface disturbance exists within 0.5 mile of these identified nests. Nevertheless, the incremental contribution of the proposed project to the total surface disturbance within 0.5 mile of a golden eagle nest could range from a low of 96 acres under Alternative B to a high of 3,044 acres under Alternative C. The incremental contribution of the proposed project to the total surface disturbance within 0.5 miles of a documented ferruginous hawk nest could range from a low of 118 acres under Alternative B to a high of 2,526 acres under Alternative C. The incremental contribution of the proposed project to the total surface disturbance within 0.25 mile of a documented short-eared owl nest could range from a low of 1 acre under Alternative B to a high of 20 acres under Alternative C. Additionally, the incremental contribution of the proposed project to the total surface disturbance within

0.25 mile of a documented burrowing owl nest could range from a low of 1 acre under Alternative B to a high of 187 acres under the Alternative C.

5.10.1.4 Fringed Myotis, Spotted Bat, and Townsend's Big-eared Bat

The amount of surface disturbance to pinyon-juniper woodland, desert shrub, and riparian woodland habitats used for foraging by the fringed myotis, spotted bat, and Townsend's big-eared bat within the CIAA is currently unknown. However, the surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with other past, present, and reasonably foreseeable actions, would cumulatively and incrementally affect vegetation communities that these bat species potentially use for foraging across the CIAA. Depending on the alternative selected, the total surface disturbance to pinyon-juniper woodland, desert shrub, and riparian woodland habitats within the CIAA would be approximately 7,885 acres under Alternative A – Proposed Action; 433 acres under Alternative B – No Action Alternative; 10,342 acres under Alternative C – Field-wide Electrification; or 5,856 acres under Alternative D - Agency Preferred Alternative.

Under the proposed project, the total surface disturbance to Colorado Plateau Mixed Bedrock Canyon and Tableland habitats potentially used for roosting by these species within the CIAA would be approximately 468 acres under Alternative A – Proposed Action; 18 acres under Alternative B – No Action Alternative; 602 acres under Alternative C – Field-wide Electrification; or 254 acres under Alternative D - Agency Preferred Alternative. Indirect cumulative impacts to these species would likely include noise from construction activities, vehicle traffic, and increased human presence. However, these impacts would be impossible to quantify.

Additionally, bat species within the CIAA could be impacted by the increase in open pits (i.e., reserve pits) under all alternatives. While the impacts from each individual pit would be relatively small and short term, the simultaneous presence of large numbers of open pits on the landscape presents a potentially significant cumulative hazard to bat species. These impacts would be greatest under the Proposed Action and Alternative C, as they propose the largest number of wells.

5.10.1.5 White-tailed Prairie Dog

The amount of surface disturbance to mapped white-tailed prairie dog colonies within the CIAA is currently unknown. However, the surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with other past, present, and reasonably foreseeable actions, would cumulatively and incrementally affect white-tailed prairie dog colonies within the CIAA. Depending on the alternative selected, the total surface disturbance to mapped white-tailed prairie dog colonies within the CIAA would be approximately 1,331 acres under Alternative A – Proposed Action; 40 acres under Alternative B – No Action Alternative; 1,645 acres under Alternative C – Field-wide Electrification; or 916 acres under Alternative D - Agency Preferred Alternative.

5.10.1.6 Greater Sage-grouse

While it is likely that some sage-grouse use portions of the Project Area on a limited basis, there are no habitats designated as occupied, brood rearing, or winter habitats for sage-grouse within the MBPA. Therefore, incremental impacts from the proposed project on sage-grouse within the CIAA would not be cumulatively considerable.

5.10.1.7 Mountain Plover

Although there has been only one documented occurrence of mountain plover nesting within the Uinta Basin, the potential for future nesting in the CIAA area cannot be entirely discounted. The majority of potential mountain plover habitat and all of the concentration areas for mountain plover within the CIAA are contained within the MBPA. The total surface disturbance to mountain plover concentration areas within the CIAA under each alternative would be:

- Alternative A (Proposed Action) – 71 acres
- Alternative B (No Action) – 3 acres
- Alternative C (Field-wide Electrification – 87 acres
- Alternative D (Agency Preferred Alternative) – 21 acres

Depending on the alternative selected, the total surface disturbance to potential mountain plover habitat within the CIAA would be approximately 10,446 acres under Alternative A – Proposed Action; 386 acres under Alternative B – No Action Alternative; 12,269 acres under Alternative C – Field-wide Electrification; or 6,411 acres under Alternative D - Agency Preferred Alternative. This, combined with impacts from other past, present and reasonably foreseeable oil and gas development, livestock grazing, and recreational activities, has the potential to result in substantial cumulative loss and fragmentation of plover habitat.

5.10.2 Special Status Plant Species and State Species of Concern

Impacts to special status plant species and state species of concern would be similar to those discussed in **Section 5.7.1** for general vegetation. However, given their ongoing habitat loss, declining population, and sensitivity to disturbance, these species would likely be more susceptible to the impacts associated with oil and gas development within the CIAA.

5.10.2.1 Uinta Basin Hookless Cactus and Pariette Cactus

The CIAA for the Uinta Basin hookless cactus and the Pariette cactus is the extent of potential habitat for the Uinta Basin hookless cactus and the Pariette cactus in the Vernal Planning Area. Direct cumulative impacts to this species could result from direct individual loss from trampling, temporary or permanent removal of aboveground cover, the temporary or permanent loss of suitable habitat, and soil compaction as a result of construction and operation activities, grazing, and recreational use. Indirect cumulative impacts include:

- Habitat fragmentation;
- Increased dust effects;
- Introduction and spread of invasive and noxious weed species;
- Temporary or permanent loss of suitable habitat; and
- Changes to the composition of the native vegetative community from surface disturbance activities such as oil and gas development, grazing, access road construction, seismic surveys, well staking, cultural resources surveys, biological surveys, and other human activities.

Changes in land use patterns or increased human encroachment could also adversely impact occupied and suitable habitats. In addition, recovery and reclamation of suitable habitats could be compounded by limiting reclamation conditions (e.g., drought).

According to the latest potential habitat polygon for the Uinta Basin hookless cactus, the current area for potential habitat is approximately 442,000 acres, encompassing federal, state, Indian trust, and private land ownership. Relatively recent geographic data for the Uinta Basin hookless cactus includes over 18,400 points, representing approximately 40,528 individual cacti. These counts include both living and dead plants; however, the numbers do not include hybrids of the Uinta Basin hookless cactus and Pariette cactus, as the surveys occurred outside of the area where the two species overlap. Based on survey data from 2011 and extrapolation to unsurveyed suitable habitat, the total count for the Uinta Basin hookless cactus is approximately 50,000 individuals (BLM 2012f).

The current area for potential Pariette cactus habitat is approximately 115,900 acres, encompassing federal, state, Indian trust, and private land ownership. Relatively recent geographic data for the Pariette cactus indicated 16,072 points, representing approximately 23,589 individual cacti. These counts include both living and dead plants; however, the numbers do not include hybrids with the Uinta Basin hookless cactus. A conservative minimum estimate for the total population of Pariette cactus is in the range of 23,000-29,000 individuals (USFWS 2014).

To estimate the approximate amount of surface disturbance that currently exists within the potential habitat polygon for the Uinta Basin hookless cactus and Pariette cactus, GIS data was obtained from UDOGM that shows approximately 5,161 oil and gas well locations within the habitat boundary (see **Table 5.10.2.1-1**). A very conservative estimate (i.e., worst-case estimate) of 5 acres of surface disturbance for each well (which includes associated roads and pipelines) was used to calculate the amount of acreage within the potential habitat polygon that is already disturbed by energy development. Based on these calculations, it is estimated that over 25,805 acres (5 percent) of habitat within the potential habitat polygon for the Uinta Basin hookless cactus and Pariette cactus is currently disturbed as a result of past and present oil and gas development. It is important to note, however, that this value is highly likely to be an overestimate, as the UDOGM data base does not account for multi-well pads. Therefore, while there are currently 5,161 wells within the *Sclerocactus* polygon area, it is likely that the number of well pads and associated surface disturbance is far less than estimated. Nonetheless, this EIS assumes the most conservative estimate for analysis purposes.

Surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development, would cumulatively and incrementally affect potential habitat for Uinta Basin hookless cactus and Pariette cactus across the CIAA. Approximately 25,805 acres of potential habitat for these species within the CIAA has already been disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to potential habitat for these species within the CIAA would be increased to approximately 33,467 acres under Alternative A – Proposed Action; 26,154 acres under Alternative B – No Action Alternative; 34,973 acres under Alternative C – Field-wide Electrification; or 30,100 acres under Alternative D - Agency Preferred Alternative (see **Table 5.10.2.1-1**). Disturbance would last for the duration of oil and gas development and production, until such time that reclamation has proven successful.

TABLE 5.10.2.1-1
SUMMARY OF IMPACTS TO UINTA BASIN HOOKLESS CACTUS AND PARIETTE CACTUS HABITAT WITHIN THE SCLEROCACTUS POTENTIAL HABITAT POLYGON

Habitat Type	Area (Acres)	Estimated Acreage of Disturbance from Past, Present, and Future Oil and Gas Activity*	Disturbance by Alternative (Acres)	Cumulative Total Disturbance (Acres)	Cumulative Disturbance Percentage (%)
Potential Habitat	**537,564**	**25,805**	**--**	**25,805**	**4.8**
Alternative A	--	25,805	7,662	33,467	6.2
Alternative B	--	25,805	349	26,154	4.9
Alternative C	--	25,805	9,168	34,973	6.5
Alternative D	--	25,805	4,295	30,100	5.6

* It is important to note that existing disturbance calculations based on UDOGM wells are likely a gross overestimate. The UDOGM data does not account for multiple wells being drilled from a single pad. Therefore, actual, existing surface disturbance is likely far lower than that identified in the table above.

Table 5.10.2.1-2 summarizes a range of cumulative surface disturbance within the Core Conservation Areas 1 and 2 in the Upper and Lower Pariette Bench regions based on both Newfield and USFWS existing disturbance calculation methodologies. The Upper and Lower Pariette Bench Core Conservation Areas occur entirely within the MBPA and Newfield's EDA #1 Project Area to the north and east of the MBPA.

As discussed in Section 3.10.1.2.1, the USFWS and Newfield have different methods of calculating surface disturbance. This discussion reflects both methodologies, and thus a range of existing disturbance within the Core Conservation Areas

Under Newfield's assumptions, existing disturbance was determined using a custom dataset developed by Spatial Energy for Newfield based on aerial imagery analysis, which was flown annually for the MBPA between 2006 and 2013 and is referred to as "SPOT6" data. Additional information on existing disturbance was collected using a May 2014 "vendor" map that illustrates existing facilities and infrastructure within the MBPA. For portions of the Core Conservation Areas that did not have SPOT6 data or vendor map information, Newfield relied on sources such as as-built diagrams and plats from land surveyors that contain accurate information on existing facility locations and sizes.

As previously noted, to calculate existing disturbance the USFWS assumes 5 acres of disturbance for every well. A breakdown of existing wells[2] within the Core Conservation Areas according to UDOGM's data base as of January 16, 2015 is provided below:

[2] UDOGM well count includes wells in the following categories: shut-in, producing, drilling, abandoned, temporarily abandoned, active, inactive, location abandoned, and drilling operations suspended.

	Core 1		Core 2	
	Upper Pariette	**Lower Pariette**	**Upper Pariette**	**Lower Pariette**
Existing Wells				
MBPA	132	30	399	33
EDA #1	26	29	53	5

Existing disturbance using each calculation methodology was then added to proposed disturbance under each alternative within this EIS, plus anticipated disturbance evaluated under Alternative C of Newfield's EDA #1 Environmental Assessment (EA), which was approved April 21, 2014 in the Record of Decision for EA # U&O-FY13-Q4-133. Disturbance acreages and percentages were evaluated by Core Conservation Area type (1 and 2) and by Upper and Lower Pariette. The lower range in Table 5.10.2.1-2 summarizes cumulative disturbance based on Newfield calculations for existing disturbance. The higher range in Table 5.10.2.1-2 summarizes cumulative disturbance based on USFWS calculation assumptions for existing disturbance.

TABLE 5.10.2.1-2
CUMULATIVE, LONG-TERM DISTURBANCE RANGES WITHIN THE UPPER AND LOWER PARIETTE CORE CONSERVATION AREAS
(LOWER END OF RANGE CALCULATED USING BLM METHOD FOR CALCULATING EXISTING DISTURBANCE, HIGHER END OF RANGE BASED ON USFWS METHOD FOR CALCULATING EXISTING DISTURBANCE BASED)

Alternative	Existing / Long-term / Total Disturbance	Level 1 Core Conservation Area Cumulative Disturbance				Level 2 Core Conservation Area Cumulative Disturbance			
		Upper Pariette[1]	Lower Pariette[2]	Total (acres) Upper and Lower Pariette	Total (%) Upper and Lower Pariette	Upper Pariette[3]	Lower Pariette[4]	Total (acres) Upper and Lower Pariette	Total (%) Upper and Lower Pariette
	Existing (acres)	206.05 - 660	112.3- 150	--	--	496.15 – 1,995	77.7 - 165	--	--
	MBPA Long-term (acres)	163.07	87.62	--	--	558.45	202.97	--	--
	EDA #1 Long-term (acres) [6]	4.88	7.27	--	--	75.86	56.77	--	--
	Total (acres)	**374 – 827.95**	**207.19 – 244.89**	**581.19 – 1,072.84**	**15.5% - 28.7%**	**1,130.46 – 2,629.31**	**337.44 – 424.74**	**1467.9 – 3,054.05**	**6.74% - 14.01%**
Alternative A	**Total (%)**	**17.99% - 39.8%**	**12.49% - 14.7%**	--	--	**7.39% - 17.18%**	**5.19% - 6.53%**		
	Existing (acres)	206.05 - 660	112.3- 150	--	--	496.15 – 1,995	77.7 - 165	--	--
	Long-term (acres)	1.06	3.2	--	--	23.97	31.34	--	--
	EDA #1 Long-term (acres)	4.88	7.27	--		75.86	56.77		
	Total (acres)	**211.99 – 665.94**	**122.77 – 160.47**	**334.76 – 826.41**	**8.9% - 22.1%**	**595.98 – 2,094.83**	**165.81 – 253.11**	**761.79 – 2,347.94**	**3.50% - 10.77%**
Alternative B	**Total (%)**	**10.20% - 32%**	**7.40% - 9.6%**	--	--	**3.90% - 13.69%**	**2.55% - 3.89%**		
	Existing (acres)	206.05 - 660	112.3- 150	--	--	496.15 – 1,995	77.7 - 165	--	--
	Long-term (acres)	329.21	215.56	--	--	781.89	304.93	--	--
Alternative C	**EDA #1 Long-term (acres)**	4.88	7.27	--		75.86	56.77	--	--

Alternative	Existing / Long-term / Total Disturbance	Level 1 Core Conservation Area Cumulative Disturbance				Level 2 Core Conservation Area Cumulative Disturbance			
		Upper Pariette[1]	Lower Pariette[2]	Total (acres) Upper and Lower Pariette	Total (%) Upper and Lower Pariette	Upper Pariette[3]	Lower Pariette[4]	Total (acres) Upper and Lower Pariette	Total (%) Upper and Lower Pariette
	Total (acres)	**540.14 – 994.09**	**335.13 – 372.87**	**875.27 – 1,366.96**	**23.4% - 36.58**	**1353.9 – 2,852.75**	**439.4 – 526.7**	**1,793.3 – 3,379.45**	**8.23% - 15.5%**
	Total (%)	**25.99% - 47.8%**	**20.21% - 22.4%**	--	--	**8.85% - 18.64%**	**6.76% - 8.10%**		
	Existing (acres)	206.05 - 660	112.3- 150	--	--	496.15 – 1,995	77.7 - 165	--	--
	Long-term (acres)	51.35	6.14	--	--	250.5	109.25	--	--
	EDA #1 Long-term (acres)	4.88	7.27			75.86	56.77	--	--
	Total (acres)	**262.28 – 716.23**	**125.71 – 163.41**	**387.99 – 879.64**	**10.4% - 23.5**	**822.51 – 2321.36**	**243.72 – 331.02**	**1,066 – 2,652.38**	**4.9% - 12.17%**
Alternative D[5]	**Total (%)**	**12.6% - 34.5%**	**7.6% - 9.85%**	--	--	**5.4% - 15.17%**	**3.7% - 5.09%**	--	--

[1]2078.45 acres in Upper Pariette Level 1 Core Conservation Area
[2]1658.19 acres in Lower Pariette Level 1 Core Conservation Area
[3]15297.56 in Upper Pariette Level 2 Core Conservation Area
[4]6495.48 in Lower Pariette Level 2 Core Conservation Area
[5] It is important to note that under Alternative D, new surface disturbance within the MBA include a BLM priority to keep total surface disturbance in the Level 2 areas below 5% of Level 2 core conservation areas.
[6]Based on surface disturbance under Alternative C of Newfield's EDA #1 EA, which was approved in EA # U&O-FY13-Q4-133.

5.10.2.2 Ute Ladies'-tresses

Since habitat for the Ute Ladies'-tresses is generally limited to the convergence of the Green River and Pariette Draw and within portions of the Pariette Wetlands, its potential distribution within the CIAA is limited. Direct disturbance to potential habitat for this species is unlikely, because little disturbance to wetlands would likely occur under implementation of any of the four alternatives. For the same reasons, the potential for occurrence of indirect and dispersed direct effects to this species would be unlikely to occur. Therefore, incremental impacts from the proposed Project on the Ute Ladies'-tresses within the CIAA are unlikely to be cumulatively considerable.

5.10.2.3 Barneby's Catseye, Graham's Catseye, and Sterile Yucca

The amount of surface disturbance to potential habitat for Barneby's catseye, Graham's catseye, and sterile yucca within the CIAA is currently unknown. However, the surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D would cumulatively and incrementally affect potential habitat for these species. Depending on the alternative selected, the incremental contribution of total surface disturbance to suitable habitat for Barneby's catseye within the CIAA would be approximately 1,292 acres under Alternative A – Proposed Action; 80 acres under Alternative B – No Action Alternative; 1,688 acres under Alternative C – Field-wide Electrification; or 913 acres under Alternative D - Agency Preferred Alternative.

The total incremental contribution of surface disturbance to suitable habitat for Graham's catseye within the CIAA would be approximately 7,399 acres under Alternative A – Proposed Action; 721 acres under Alternative B – No Action Alternative; 9,646 acres under Alternative C – Field-wide Electrification; or 7,971 acres under Alternative D - Agency Preferred Alternative. With regard to sterile yucca, the total surface disturbance to suitable habitat for this species within the CIAA would be approximately 1,518 acres under Alternative A – Proposed Action; 100 acres under Alternative B – No Action Alternative; 1,978 acres under Alternative C – Field-wide Electrification; or 1,213 acres under Alternative D - Agency Preferred Alternative.

5.10.2.4 Green River Greenthread

Since Green River greenthread is generally limited to white shale slopes and ridges at elevations greater than 5,900 feet in elevation, its potential distribution within the MBPA is extremely limited, and direct disturbance to potential habitat for this species is unlikely. Therefore, incremental impacts from the proposed project on this species within the CIAA are unlikely to be cumulatively considerable.

5.11 Cultural Resources

The CIAA for cultural resources is the boundary of the MBPA. Cumulative impacts to cultural resources are defined as any damage to or destruction of cultural resources that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions (40 CFR 1508.7). The magnitude of impacts may be greater or less depending on 1) the cultural resource site densities present in the area of project-related activities; 2) the importance of the cultural resources present; and 3) the final magnitude and scope of reasonably foreseeable actions over the next 20 years. It is important to remember that damage to or destruction of these resources is often site-specific and not additive across a landscape. However, site-specific damage of cultural resources may impede the ability to understand a region's history in the future.

Impacts to cultural resources within the CIAA from past, present, or reasonably foreseeable future actions would primarily result from activities associated with surface and subsurface disturbance. Impacts to cultural resources may also result from specific cultural resource management decisions and from non-surface-disturbing activities that create atmospheric, visual, and/or auditory effects. These latter impacts would apply to sites or locations that together comprise the overall cultural experience for all visitors to the area. For example, Native American tribes often interpret cultural resource sites or locations as sacred or traditionally important and use them in such a manner that atmospheric change, visual obstructions, and/or noise levels could impinge upon such use. These types of impacts cumulatively affect not only the historic setting, feeling, and viewshed of cultural properties, but also their potential eligibility for nomination to the NRHP.

As shown in **Table 5.3-1,** approximately 9,416 acres of land within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to cultural resources within the CIAA would be increased to 25,545 acres under Alternative A – Proposed Action; 10,286 acres under Alternative B – No Action Alternative; 29,528 acres under Alternative C – Field-wide Electrification; or 19,538 acres under Alternative D - Agency Preferred Alternative.

As discussed in **Section 3.11.6,** there are approximately 1,123 previously documented archaeological sites with the MBPA. These sites include prehistoric (n= 599), historic (n= 468), and multicomponent (n= 56). Specific direct impacts to presently unknown cultural resources from reasonably foreseeable development would not be known until surveys are completed for all areas within the CIAA where surface disturbance is proposed. Cultural resource properties would be evaluated for their eligibility for listing on the NRHP. While the potential for direct impacts to eligible cultural resources would likely increase as a result of increased surface disturbance, these impacts can be reduced through the preparation and execution of appropriate mitigation measures approved by the responsible federal and state agencies. Because cultural resource surveys would be required prior to any surface-disturbing activities in the MBPA and all NRHP-eligible sites would be avoided or appropriately mitigated, cumulative contributions to direct impacts on cultural resources would likely be minimal.

Although archaeological sites located within disturbance areas would be avoided or mitigated, sites located outside of and adjacent to disturbance areas would be vulnerable to indirect impacts. Implementation of the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with other past, present, and reasonably foreseeable actions, could cumulatively affect unknown cultural resources in the MBPA. These actions may include the introduction of atmospheric, visual, and auditory intrusions; increased visitation and pedestrian traffic during well field development and operation; OHV and other motorized vehicle use; and unknown impacts to cultural resource sites and cultural landscapes.

It is anticipated that there could be a cumulative increase in vandalism, illegal collection, and dust due to the new roads in the MBPA, as well as increased erosion at sites located in the vicinity of well pads, roads, and pipelines where vegetation cover has been reduced or eliminated. These impacts may alter the overall historic setting and visitor experience throughout the CIAA. Generally speaking, project-related activities would incrementally and cumulatively add to the loss of important cultural resources across the CIAA. These types of impacts pose consequences for the breadth, completeness, and interpretative value of the archaeological record. Nevertheless, beneficial cumulative impacts would likely occur, as undocumented cultural resources are discovered and preserved.

Under all alternatives, cultural resources would be protected by site-specific mitigation measures on a well-by-well basis as part of the APD approval process. Alternatives A, C, and D include measures to protect cultural resources by incorporating several ACEPMs (see **Section 2.2.12.8**) that are intended to minimize or avoid project-specific and cumulative impacts. In addition, many potential cumulative impacts to cultural resources would be reduced or eliminated through implementation of federal regulatory laws, actions, and guidelines designed to protect cultural resources, as well as through the coordination and consultation with the SHPO and Native American Tribal representatives.

5.12 Land Use and Transportation

The CIAA for land use and transportation is defined as the MBPA plus the many roads and highways between Vernal, Fort Duchesne, Roosevelt, and Duchesne that would be used to access the MBPA for project related activities. Oil and gas development has been prominent on the landscape in and around the MBPA for many years and is likely to continue in the future.

As shown in **Table 5.3-1**, surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with all past, present, and reasonably foreseeable development would cumulatively and incrementally affect lands across the CIAA. Approximately 9,416 acres of land within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to land use and transportation within the CIAA would increase to approximately 25,545 acres under Alternative A – Proposed Action; 10,286 acres under Alternative B – No Action Alternative; 29,528 acres under Alternative C – Field-wide Electrification; or 19,538 acres under Alternative D - Agency Preferred Alternative.

5.12.1 Land Use

The proposed oil and natural gas development project would be consistent with other development within the CIAA, which is mostly oil and gas exploration and production activities. There are no commercial buildings/facilities or private residences within the MBPA; therefore, cumulative development would not affect these land uses. As discussed in **Section 5.7.1**, the proposed project may contribute to negative effects on vegetation communities, including lands used for agriculture, ranching, and wildlife habitat management.

5.12.2 Transportation

The CIAA has an existing road network in place that serves local land uses, including oil and gas well development activities. Further expansion of the road network in the MBPA to accommodate oil and gas development would have both adverse and beneficial impacts. Adverse impacts could include an incremental increase in project-related traffic and accidents associated with primary access roads, and a greater need for maintenance on new and existing roads as heavy truck traffic increases. Similarly, roads outside but leading to the MBPA would receive heavier traffic and would lead to cumulative effects on traffic and road deterioration when combined with vehicle use from other past, present, and reasonably foreseeable activities. A potential beneficial cumulative impact within the MBPA would include the expansion of a maintained road network that would serve both recreational visitors and the oil and gas development workforce.

In areas where oil and gas development is already in existence, more dead-end roads would be built as additional wells are drilled. As infill development moves into areas with a less-developed road network, both collector and dead-end roads would be constructed to meet transportation needs. Project-related traffic on these roads would be greatest during construction, drilling, and completion phases. However, it is expected that the use of telemetry, when operationally feasible, would enable remote monitoring in some locations, which would reduce the need for vehicle trips.

New road construction could lead to greater access to areas where recreational activities could be enjoyed (see **Section 5.13**). As the volume of passenger vehicle traffic rises, the probability of experiencing accidents with large trucks using the same access roads would increase.

5.13 Recreation

The CIAA for recreation is as defined as MBPA and a 2-mile buffer surrounding the MBPA. It includes not only portions of the Gasco EIS, XTO River Bend Unit EA, and Newfield EDA #1 Project Areas, but also the entire Newfield Castle Peak and Eight Mile Flat EIS Project Area. Cumulative impacts to recreation could include altered recreational experiences due to noise and activities associated with oil and gas development.

As shown in **Table 5.13-1,** surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with past, present, and reasonably foreseeable actions would cumulatively and incrementally affect lands across the CIAA. Approximately 12,060 acres of land within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. Depending on the alternative selected, the total surface disturbance to recreation within the CIAA would increase to approximately 28,189 acres under Alternative A – Proposed Action; 12,930 acres under Alternative B – No Action Alternative; 32,172 acres under Alternative C – Field-wide Electrification; or 22,182 acres under Alternative D – Agency Preferred Alternative.

TABLE 5.13-1
SURFACE DISTURBANCE ESTIMATES FOR EXISTING, ONGOING, AND PENDING OIL AND GAS PROJECTS IN THE CIAA FOR RECREATION

Project Name	Totals in CIAA			
	Project Area (acres) [1]	Surface Disturbance (acres) [2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	3,725	100	3,725
Gasco Uinta Basin EIS	206,826	10,302	35	3,581
XTO Kings Canyon EA	44,637	1,131	3	36
XTO River Bend Unit EA	16,719	1,075	3	32
Newfield Castle Peak and Eight Mile Flat EIS	65,381	3,701	100	3,701
Newfield EDA #1	77,647	2,494	39	984
Total Existing, Operational, and Proposed Projects	**-**	**22,428**	**-**	**12,060**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	16,129	100	16,129

Project Name	Totals in CIAA			
	Project Area (acres)[1]	Surface Disturbance (acres)[2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Grand Total (if Proposed Action is selected)	**-**	**38,557**	**-**	**28,189**
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	870	100	870
Grand Total (if No Action Alternative is selected)	**-**	**23,298**	**-**	**12,930**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	20,112	100	20,112
Grand Total (if Alternative C is selected)	**-**	**42,540**	**-**	**32,172**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	10,122	100	10,122
Grand Total (if Alternative D is selected)	**-**	**32,550**	**-**	**22,182**

[1] Acreage for each project area was compiled from various notices and NEPA documents.
[2] Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production (BLM 2012a).. (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well.)

While areas near the Green River would be affected by industrial noise from oil and gas operations, the addition of wells from the proposed project would have a minimal cumulative impact to recreational activities within the CIAA. No direct physical impact would occur to the recreational areas, nor would access to these areas be restricted.

Prior oil and gas development has already built an existing road network throughout the CIAA. These roads have reduced the character of primitive recreational activities in the area, including naturalness, unconfined recreation, and solitude. Each of the four alternatives would contribute to impact on primitive recreational activities; however, the No Action Alternative would contribute significantly less to this cumulative impact than would the Proposed Action and the other action alternatives. On the other hand, additional roads associated with new development would provide recreational users with even more potential access, especially for motorized recreation. Restrictions and closures during oil and gas construction and development could impact some recreationists in the short term, while production intensive activities could cause other recreationalist (e.g., hunters and OHV users) to avoid areas that have been heavily developed over the long term.

5.14 Visual Resources

For surface disturbance estimate purposes, the CIAA for visual resources is defined as the Lower Green River ACEC and the Wild and Scenic Green River Corridor within a 2-mile buffer surrounding the MBPA (refer to **Table 5.1-1**). However, the true CIAA involves these special designations plus the viewsheds for these special designations, which could be larger than the 2-mile buffer. Cumulative impacts to visual resources are affected by ongoing resource management and energy extraction in this area and are generally managed under a common land use plan. Development of oil and gas typically includes construction of roads, well pads, pipelines, power lines, compressors, and other facilities.

Oil and gas development has transformed the land to a more roaded, developed, and somewhat industrial landscape. Depending on the landform, vegetation type, and well spacing, the surface disturbance and production facilities associated with oil and gas development are visible in the landscape to varying degrees. This type of development dominates the landscape in most of the CIAA. Oil and gas development or other similar surface-disturbing activities are consistent with VRM Class III and IV management objectives. However, surface-disturbing activities on these same lands may not be consistent with VRM Class II objectives. Unless the disturbances are associated with pre-RMP leases, they would need to be mitigated to a level where they would not attract the attention of a casual observer; that is, if the lease was signed pre-RMP, it would be a valid pre-existing contractual right that may not be subject to visual objectives.

As shown in **Table 5.14-1,** surface disturbance associated with the Proposed Action, No Action Alternative, Alternative C, or Alternative D, combined with past, present, and reasonably foreseeable actions would cumulatively and incrementally affect lands across the CIAA. Approximately 9,758 acres of land within the CIAA has been or will be disturbed by past, present, and future oil and gas activities. Of the existing disturbance in the CIAA, the majority is in Class IV areas, some disturbance is in Class III areas, and less than two acres is in Class II areas. Depending on the alternative selected, the total surface disturbance to visual resources (the characteristic landscape) within the CIAA would increase to approximately 25,887 acres under Alternative A – Proposed Action; 10,628 acres under Alternative B – No Action Alternative; 29,870 acres under Alternative C – Field-wide Electrification; or 19,880 acres under Alternative D – Agency Preferred Alternative.

Other public land uses have resulted in an unknown quantity of surface-disturbing activities that have affected the character of the landscape. For example, construction of livestock facilities (e.g., fences and waters), cross-country OHV driving, and vegetation treatments (e.g., chainings) have altered the existing character of the landscape by changing vegetation patterns and introducing human-made features on the land.

TABLE 5.14-1
SURFACE DISTURBANCE ESTIMATES FOR EXISTING, ONGOING, AND PENDING OIL AND GAS PROJECTS IN THE CIAA FOR VISUAL RESOURCES

Project Name	Totals in CIAA			
	Project Area (acres) [1]	Surface Disturbance (acres) [2]	Portion of Project Area in CIAA (percent)	Estimated Surface Disturbance in CIAA (acres)
Existing Development within the MBPA	119,743	3,725	100	3,725
Gasco Uinta Basin EIS	206,826	10,302	21	2,133
XTO Kings Canyon EA	44,637	1,131	17	188
XTO River Bend Unit EA	16,719	1,075	0.4	4
Newfield Castle Peak and Eight Mile Flat EIS	65,381	3,701	100	3,701
Newfield EDA #1	77,647	2,494	0.3	7

Project Name	**Totals in CIAA**			
	Project Area (acres) [1]	**Surface Disturbance (acres)** [2]	**Portion of Project Area in CIAA (percent)**	**Estimated Surface Disturbance in CIAA (acres)**
Total Existing, Operational, and Proposed Projects	**-**	**22,428**	**-**	**9,758**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Proposed Action is selected)	119,743	16,129	100	16,129
Grand Total (if Proposed Action is selected)	**-**	**38,557**	**-**	**25,887**
Newfield's Greater Monument Butte Oil & Gas Development Project (if No Action Alternative is selected)	119,743	870	100	870
Grand Total (if No Action Alternative is selected)	**-**	**23,398**	**-**	**10,628**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative C is selected)	119,743	20,112	100	20,112
Grand Total (if Alternative C is selected)	**-**	**42,540**	**-**	**29,870**
Newfield's Greater Monument Butte Oil & Gas Development Project (if Alternative D is selected)	119,743	10,122	100	10,122
Grand Total (if Alternative D is selected)	**-**	**32,550**	**-**	**19,880**

[1] Acreage for each project area was compiled from various notices and NEPA documents.
[2] Surface Disturbance is the initial disturbance value that accounts for well pad, access road, pipeline, and any additional structures associated with oil and gas production (BLM 2012a). (Note: Any projects without a designated surface disturbance rate were assigned a total equivalent to 3.6 acres per well.)

Variations in the amount of surface disturbance, road construction, and placement of facilities would be different among the alternatives, but the cumulative effects would be similar.

5.15 Special Designations

For surface disturbance estimation purposes, the CIAA for impacts to special designations is defined as the special designation areas themselves. However, the true CIAA would be the areas themselves plus the viewsheds into these special designations from outside the MBPA. These include the Pariette Wetlands ACEC, the Lower Green River Corridor ACEC, and the proposed Lower Green River WSR area (**see Figure 3.15-1 – Attachment 1**).

Past oil and gas exploration has resulted in approximately 3,725 acres of disturbance within the CIAA. Development of oil and gas typically includes construction of roads, well pads, pipelines, power lines, compressors, and other facilities. This type of development has created surface disturbance and altered the land, but has not eliminated the relevant and important values of the Pariette Wetlands ACEC (wetlands and wetland special-status species) or the Lower Green River ACEC (riparian and scenic), nor has it eliminated the ORVs of the Lower Green River WSR (fish and recreation). Other land uses, such as livestock grazing and OHV driving, have resulted in an unknown quantity of surface-disturbing activities.

As described above, reasonably foreseeable development would create surface disturbances that would have similar impacts to special management areas. Reasonably foreseeable actions include other oil and gas projects that fall within ACECs in the MBPA vicinity, including the Newfield EDA, Newfield Castle Peak and Eight Mile Flat, Gasco Uinta Basin, and the XTO Riverbend projects. These projects would result in some amount of surface disturbance in at least one of the ACECs. As discussed in **Section 4.15**, if the Proposed Action were implemented, up to 1,209 acres would be initially disturbed in the Pariette Wetlands ACEC, while the No Action Alternative would initially disturb approximately 62 acres. Under Alternative C, there would be approximately 1,244 acres of initial disturbance within the Pariette Wetlands ACEC, while there would be approximately 447 acres of initial disturbance under Alternative D.

However, as described in **Section 4.15**, surface disturbance within special designation areas would not necessarily result in significant adverse impacts to the identified relevant and important values for which the ACECs were designated, or to the ORVs for which the WSR had been analyzed. BLM policy requires protection of the values that make these places eligible for consideration as special designation areas (subject to valid existing rights), but this requirement would not necessarily preclude oil and gas well development. As previously noted, the project applicant has existing valid lease rights within the Pariette Wetlands ACEC. Although some surface disturbance would occur in each special designation area as a result of the project, mitigation would ensure that the ACECs and proposed WSR would maintain eligibility for their respective designations.

For special designated areas where VRM Class II occurs, VRM Class II objectives could be used to benefit other relevant and important values for which the ACEC was designated and ORV values for which the WSR has been analyzed. Such objectives would be applicable to maintaining the wetland habitat value of the Pariette Wetlands ACEC and the scenic value of the Lower Green River ACEC, with indirect impacts on other relevant and important ACEC values and ORVs.

5.16 Socioeconomics

The CIAA for socioeconomic impacts is defined as the spatial boundary of Duchesne and Uintah Counties. This spatial boundary was selected because oil and gas development within the Uinta Basin has had substantial impact on taxes and royalties collected by the State of Utah, much of which has been reallocated to Duchesne and Uintah Counties. Because minority, low-income, and Tribal populations currently reside in these counties, they would all be considered when evaluating environmental justice concerns for oil and gas projects. Moreover, oil and gas development is the largest variable component of reasonably foreseeable actions in the CIAA. As an industry, it supports large segments of the local economy (e.g., funding local public facilities and services) and is a key driver affecting local population, demographic, and migration trends. Other historically and economically important segments of the CIAA economic base are grazing and recreation. However, information regarding trends in those economic segments is lacking and can only be evaluated on a qualitative basis.

5.16.1 Socioeconomics

5.16.1.1 Economic Effects

Without a vast supply of energy resource reserves in the area, the CIAA likely would be much less developed and populated than it is today. As a result of the ongoing development of oil and gas resources in the Uinta Basin, the rural communities within the CIAA have experienced considerable population growth. Such growth provides much of the impetus for new residential and commercial development and expansion of local government infrastructure and services. This economic activity underlies important economic and social conditions and trends in the area. For example, labor markets are characterized by unemployment that is commonly below statewide levels, higher transient elements of the workforce, competition and shortage of qualified labor, and higher labor compensation costs. Cumulative economic effects also have occurred, and energy resource development has resulted in some conflicts with recreation, tourism, and grazing on public lands.

Implementation of the proposed Project would coincide with other future development activity in the area to create similar cumulative effects. The Proposed Action or other alternatives is one of several active and proposed oil and gas projects in the area. Prior to the onset of the current economic recession, more than 25 oil and gas drilling rigs were active in Uintah and Duchesne counties (Baker Hughes Inc. 2008). More than 500 wells were spudded in Duchesne County in 2006 and 2007, with more than 1,350 additional wells spudded in Uintah County during the same period. Weaker demand and lower commodity prices in 2008 and 2009 contributed to slowdowns in the rate of exploration and development. As a result, the number of new wells spudded in the two counties was less than half the levels in the preceding 3 years (BLM 2010). Beginning in 2010, the number of new wells spudded in both Duchesne and Uintah Counties has returned to near pre-recession levels. Approximately 400 new wells were spudded in Duchesne County each year on average between 2010 and 2012. As of October 1, 2013, 318 wells have been spudded in the county (UDOGM 2013c). Uintah County has spudded about 540 new wells each year on average between 2010 and 2012. So far this year, 369 new wells have been spudded in Uintah County (UDOGM 2013c).

Despite the recent slowdown, long-term energy market forecasts call for higher prices and rising production in the Mountain region, which encompasses Utah, North Dakota, South Dakota, Montana, Wyoming, Idaho, Nevada, Colorado, Arizona, and western New Mexico. In order to achieve the 20 percent growth in projected natural gas production by 2030, including the production needed to offset declining production from existing wells, renewed development in the Uinta Basin is needed (BLM 2010). As shown in **Figure 5.16.1.1-1 (Attachment 1)**, the approximately 561 million cubic feet of natural gas production over the LOP of the Proposed Action or other alternatives is nearly equivalent to one-tenth of a single year's total production for the entire Mountain region. Over an assumed 25 years of production, the average annual production under the Proposed Action or other alternatives also would represent approximately 5 percent of the 2011 gas production for the State of Utah, which was 462 billion cubic feet (UDOGM 2013a). This development would likely be accompanied by investments in treatment, processing, compression, and transmission capacity to move the production to market (BLM 2010).

The Utah Governor's Office of Planning and Budget periodically prepares economic and demographic forecasts that examine future energy development activity and provide a perspective on cumulative growth in the region. Current projections, which were released in 2012, indicate that total employment in Duchesne and Uintah Counties will grow to 37,148 by 2040, nearly a 27 percent increase from 2010 (UGOPB 2012). For example, the Proposed Action is projected to directly support 526 jobs over the LOP and would be a major source of economic activity and personal income in the region. The employment growth is also expected to drive long-term population growth. Under the current forecasts, the two counties are projected to reach a combined population of 68,411 residents by 2040, an approximate increase of 33.5 percent over their combined 2010 populations. Although long-term projections portray a pattern of steady growth, future growth will likely be characterized by periods of more rapid growth and decline that reflect the scale and timing of cumulative actions.

After vacant housing, vacant commercial and industrial space, and available capacities in public facilities have been absorbed, additional accommodations for future growth would require new residential and non-residential development and public infrastructure expansion. Public sector expenditures would likely increase in conjunction with infrastructure expansion and growth in staffing and services to meet higher demands. The level of development and employment associated with the Proposed Action or other alternatives would be one of many contributors to growth pressures over the next decade. Once the development phase is completed, the incremental contribution margin attributable to the proposed project would decline in terms of employment, population, housing demand, and demands on public services because other activities would be responsible for increasing shares of future growth.

Implementation of the Proposed Action or other alternatives would combine taxes, royalties, and other public sector revenues with those generated by other cumulative actions to help fund local governments, school districts, and the State of Utah government. Due to the vast federal, Indian trust, and state lands in the area, energy resource development generates substantial revenues in the form of mineral lease royalties and severance taxes.

Federal mineral lease royalties would accrue to federal and state governments. Because no Indian trust lands or minerals are present within the MBPA, no mineral lease royalties would benefit the Ute Tribe. Severance taxes royalties on production from state lands would accrue to the state's coffers. Substantial property taxes levied on the value of production, as well as production, processing, and transportation equipment and facilities, would accrue to local entities, principally the counties and school districts. A 2009 University of Utah study reported that approximately $416 million in federal mineral royalties and lease bonus payments and about $65.5 million in severance taxes were generated from oil and gas production in Utah in 2008, the bulk of which was associated with activity in the Uinta Basin. Property taxes and royalties derived from production on state lands yielded approximately $62 million (University of Utah 2009). Oil and gas development generates sales and use taxes and other fees (both directly and indirectly) from households and incomes supported by development and production.

Cumulative actions, including the Proposed Action or other alternatives, would continue to generate these kinds of revenues over the long term, although they would fluctuate over time in response to changes in commodity prices and production levels. For example, under the Proposed Action, public sector revenues that would be generated from future production are projected to be approximately $73.6 million to the combined Uintah County and Duchesne County economies over the LOP (see **Table 4.16.1.1.3-2**). These project-related revenues would continue for decades following the initial effects on population growth, housing, and demands on public facilities and services. More than 60 percent of these revenues would accrue to the benefit of the state's general fund, Permanent Community Impact Fund, Permanent Public School Fund, UDOT, Duchesne and Uintah Counties, school districts in the two counties, and several other state agencies.

Cumulative adverse impacts to grazing and recreation could potentially occur within the CIAA. Economic impacts on grazing would occur as the combined effects of past, present, and future energy resource development adversely affect portions of one or more grazing allotments within the MBPA, resulting in further reductions to grazing as disturbed portions of the allotments become unavailable. Economic impacts to recreation would occur as the cumulative levels of development adversely affect the quality of the recreation experiences and potentially the level of recreation activity. These impacts could have slight incremental effects on the local tourism and outdoor recreation related industries; however, the timing, magnitude, and intensity of these effects are uncertain.

Cumulative impacts to economic and demographic conditions are subject to underlying uncertainties regarding the timing and pace of development for the various cumulative actions. These actions, in turn would be linked to factors including the availability of drilling capacity, labor force, natural gas transmission capacity, capital to implement programs, energy commodity prices, and market demand. Potential outcomes would include accelerated growth with higher population levels and greater demands on housing and services, or sustained development activity over a longer time horizon that results in future production, which is characterized by a less pronounced peak and subsequent decline commonly associated with a single project. Because energy-related population growth and decline can be sudden and unexpected, it is difficult for rural communities with limited resources to prepare for these cycles (UGOED 2006). Increased population growth could increase the demand for public services. Even with additional revenues, oil and gas development within the CIAA could eventually exceed the costs of providing these services, and impacts associated with the immediacy of the issues would not be resolved.

5.16.1.2 Social Effects

Research suggests that dramatic increases in population can have a disruptive effect on the social well-being of some segments of the local population within a rural community. Negative social consequences could include a collapse of informal social structures, conflict and tension between advocates and opponents of growth, the absence of social integration, changes in neighboring ties, decreases in community satisfaction, and a deteriorating quality of life. Rural communities impacted by boom periods can experience increases in school drop-out rates, juvenile delinquency, criminal activity, domestic/family violence, and drug and alcohol problems. These issues, in turn, can affect police and social services. However, literature also suggests that these socially disruptive effects may not be permanent. Rather, the disruptive effects associated with boom growth subside in the years after the boom phase has ended, with no evidence of lasting disruption (Smith et al. 2001). On the other hand, the positive social impacts of boom periods resulting from oil and gas development in Duchesne and Uintah Counties would include lower unemployment, higher incomes, higher housing values, less crime due to lower unemployment and higher incomes, formation of new businesses, and more revenue for public improvements.

While the pace of drilling is always subject to short-term variability, which causes cycles of expansion and contraction in communities, a growing inventory of producing wells and field facilities can support workforces for a generation or longer. By enlarging the well base, development of the proposed project would potentially add stability to the region's population. Though typically smaller than the transient job waves that accompany drilling runs, a production workforce potentially invests in and integrates with communities where industry employment is present. Communities in the Uinta Basin that have experienced rapid population change from past energy development may respond to these changes more favorably than communities that have not experienced boom-and-bust cycles (Smith et al. 2001). Furthermore, research has shown that some of the communities within the region of the MBPA have a documented history of resilient social and community responses to increases in population associated with oil and gas-related activities (Bloyer 2002). Implementation of the Proposed Action or other alternatives could generate revenues to help fund services that would address these social impacts in the longer term.

5.16.2 Environmental Justice

Under the Proposed Action and other alternatives, environmental justice would be a primary area of concern for the Tribal communities on the Uintah and Ouray Reservation. As discussed in **Section 3.15**, the communities of Fort Duchesne CDP, Randlett CDP, and Whiterocks CDP have a poverty rate of more than 50 percent. In these communities, more than 90 percent of their populations are composed of racial and ethnic minorities, mainly American Indian.

Future oil and gas development in Duchesne and Uintah Counties would likely impact Reservation lands, of which residents of the concerned communities are members. In areas where the Ute Tribe has mineral ownership, lease royalties would be collected. In areas where surface and mineral ownership are held in split estate, the Tribe would collect revenue by entering into SUAs that provide compensation for the disturbance and/or the loss of income (e.g., lost agricultural land and crop production as a result of oil and gas development). The Ute Tribe also charges a severance tax on oil and gas that is produced, transported, or sold from Tribal lands. Revenues from these sources would likely increase as cumulative development occurs on Reservation lands. The Ute Tribe could use these additional revenues to provide services to its members, including those who reside in the environmental justice communities. Therefore, cumulative development on Reservation lands would be a benefit to these communities.

As discussed above, cumulative oil and gas development would lead to increased employment opportunities in Duchesne and Uintah Counties. The Proposed Action or other alternatives would contribute to this cumulative effect. These employment opportunities would also be available to members of the Ute Tribe, including those who live in environmental justice communities. An increase in employment resulting from drilling and production activities would reduce the high poverty rates in these communities and would likely generate higher wages. Consequently, implementation of the Proposed Action or other alternatives would contribute cumulatively to beneficial impacts in environmental justice communities.

The social impacts of this cumulative development on the environmental justice communities are less clear. On the one hand, the increased employment and the potential increased availability of services would likely have a beneficial impact on the social well-being of the residents in these communities. On the other hand, these communities could experience social disruptions similar to those experienced by other communities where economic booms occur (see **Section 3.16.1.2**). Whether the potential cumulative beneficial impacts outweigh the potential cumulative adverse impacts is unknown. However, as described above, cumulative development may contribute cumulatively to improvements in socioeconomic conditions within the region, which would likely contribute to improvements to conditions in the environmental justice communities.

6.0 COORDINATION AND CONSULTATION

6.1 INTRODUCTION

This chapter identifies the issues and concerns associated with the proposed project. **Chapter 4.0** of this FEIS provides a detailed analysis of the environmental impacts of the four alternatives. **Appendix A** provides a record of the Interdisciplinary Team (IDT) checklist and identifies issues and resources that were considered and dismissed from further analysis. The issues identified through the public and agency involvement process are described below.

6.2 COORDINATION

The following list contains agencies, organizations, and individuals that were contacted and consulted, during the preparation of the EIS. Coordination with the USFWS has been ongoing for the duration of document preparation. Formal Section 7 consultation under the authority of the ESA was initiated in October 2014 and finalized on September 4, 2015. Section 106 consultation and Tribal consultation milestones are summarized below:

- June 4, 2012: A BLM letter initiated the Section 106 process and proposed consulting parties.
- August 1, 2012: Utah State Historic Preservation office confirmed the proposed consulting parties list. September 20,201: A BLM letter announced the October 11 meeting.
- September 9, 2012: The Laguna Pueblo Tribe response indicated no significant impact.
- October 11, 2012: The Hopi Tribe response requested continued consultation.
- October 11, 2012: The consulting parties defined the Area of Potential Effect as the project area, and determined that a programmatic Agreement was not needed.
- December 1, 2014: A conclusion of consultation letter was sent by the BLM on December 1, 2014.
- December 4, 2014: Section 106 consultation with Utah SHPO and any potentially affected Native American Tribes was finalized with the receipt of Utah SHPO's concurrence letter.
- December 14, 2014: Tribal consultation concluded due to lack of responses from any of the consulted Tribes.

Federal Offices

- Ashley National Forest;
- United States Environmental Protection Agency, Region 8; and
- United States Fish and Wildlife Service.

Tribes

- Northern Ute Indian Tribe

State Offices

- Utah Division of Air Quality (UDAQ);
- Utah Division of Wildlife Resources (UDWR);
- Utah Governor’s Office;
- Utah Governor’s Public Lands Policy Coordination Office (PLPCO);

- Utah School and Institutional Trust Lands Administration (SITLA);
- Utah State Office;
- Utah State Office of Energy Development; and
- Utah State Historical Preservation Office.
  - Section 106 Consultation was initiated and used to identify the APE for this project.

Local Offices

- Duchesne County;
- Duchesne County Commissioner's Office;
- Uintah County;
- Uintah County Commissioner's Office; and
- Uintah County Public Lands.

6.3 COOPERATING AGENCIES

The following entities were invited to be Cooperating Agencies (CAs):

- U.S. Environmental Protection Agency (EPA);
- State of Utah, (via the Governor's PLPCO);
- Duchesne County;
- Uintah County;
- Bureau of Indian Affairs (BIA)-Uintah and Ouray Agency, and
- The Ute Indian Tribe.

The EPA, PLPCO, Duchesne County, and Uintah County agreed to participate as CAs and have signed related memorandums of understanding (MOUs). The U.S. Fish and Wildlife Service (USFWS) and the U.S. Army Corps of Engineers (USACE) have been on-going cooperators under the BLM Energy Pilot Office program authorized by the Energy Policy Act of 2005. The remaining agencies did not participate as formal CAs, but participated as informal cooperators in a review capacity.

In addition, there was extensive coordination with the BLM Utah Air Resource Technical Advisory Group (RTAG). As required by the *NEPA Air Quality MOU for Federal Oil and Gas Decisions* (signed June 23, 2011), the RTAG met December 2012 and January 2013 to discuss the air quality analysis for this EIS. In October 2014, protocol for running this project through the Air Resource Management Strategy (ARMS) model was sought and received from EPA, National Park Service, US Forest Service, US Fish and Wildlife Service, and Utah Department of Environmental Quality, all of whom participate in the RTAG.

6.4 SUMMARY OF PUBLIC PARTICIPATION

The BLM conducted public and internal scoping to solicit input and identify environmental issues and concerns associated with the proposed project. The public scoping process was initiated on August 25, 2010, with the publication of a Notice of Intent (NOI) in the Federal Register. The BLM prepared a scoping information notice and provided copies to the public, other government agencies, and Tribes. These announcements included information on a public scoping meeting and open house, which was held at the County Commissioner's Office in Duchesne, Utah, on September 13, 2010, and at the Western Park Convention Center in Vernal, Utah, on September 20, 2010. The scoping meetings included participants from the BLM, Ashley National Forest, Uintah County Public Lands, Newfield, El Paso County, consultants, as well as local landowners. The official scoping period ended October 9, 2010.

Public response to the NOI and meetings included seven letters: two from federal agencies; one from a state agency; one from a county agency; and three from industry or private individuals. The following concerns were identified in the letters:

- Comprehensive air-quality analyses and region-wide air-quality modeling;
- Direct and indirect effects of water injection and hydrogen sulfide on gilsonite mining operations;
- Incorporation of operational flexibility into the Record of Decision and Final EIS;
- Recognition of valid existing lease rights within the Project Area by BLM;
- Explanation of the positive air quality impacts and reduction in emissions that would result from electrification;
- Limited BLM statutory or regulatory authority to regulate air quality or enforce air quality laws;
- Economic benefits to the local and state economies and SITLA;
- Conformance of the proposed project to the Vernal RMP;
- Direct, indirect, and cumulative impacts to Waters of the U.S.;
- Direct, indirect, and cumulative air quality impacts with an emphasis on fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), volatile organic compounds (VOC), and ozone;
- Protection of wetland, stream, and riparian resources;
- Alternatives for water treatment and produced water management;
- Protection of groundwater, drinking water, and irrigation water;
- Impacts of fugitive dust from construction and travel on unpaved roads;
- Impacts of noise from central facilities located near residences and wildlife in the MBPA;
- Analysis of proposed project development on water quality within Pariette Draw; and
- Potential introduction and expansion of noxious weeds in the MBPA.

The Notification of Availability for the Draft EIS was published on December 20, 2013. The Draft EIS was made available for a 45-day public comment period, which was subsequently extended by an additional 30 days at the request of the State of Utah. Three public meetings were held; one on January 21, 2014 in Salt Lake City, Utah, one on January 22, 2014 in Roosevelt, Utah, and one on January 23, 2014 in Vernal, Utah. A total of 22 unique comment letters or emails were received during the official comment period, and one letter was received after the comment period ended. The 23 comment letters or emails included one from a federal agency, one from the House of Representatives, one from a state agency, two from County governments, one from the proponent (Newfield), nine from other oil and gas industry representatives or trade groups, one from the proponent's outside legal counsel, one from a non-governmental organization, and six from private individuals. There were also 1,780 form letters received from members of the environmental community that expressed concern regarding ozone impacts, and 161 form letters received from Newfield Employees that expressed concern over impacts to their livelihoods from the Agency Preferred Alternative. A detailed list of substantive comments received and BLM's response to those comments is included in **Attachment 2** of this FEIS. However, comments largely focused on the following:

- Comments stating that the Agency Preferred Alternative was technically flawed and would not meet the purpose and need for the project;
- Comments asking the BLM to adopt the No Action Alternative;
- Comments asking the BLM to adopt the Proposed Action Alternative;
- Direct, indirect, and cumulative impacts to Waters of the U.S.;

- Direct, indirect, and cumulative air quality impacts with an emphasis on fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), volatile organic compounds (VOC), and ozone;
- Limited BLM statutory or regulatory authority to regulate air quality or enforce air quality laws;
- Economic benefits to the local and state economies and SITLA;
- Protection of wetland, stream, and riparian resources;
- Alternatives for water treatment and produced water management;
- Protection of groundwater, drinking water, and irrigation water;
- Analysis of proposed project development on water quality within Pariette Draw; and
- Surface restrictions in the Pariette Wetlands ACEC and *Sclerocactus* core conservation areas.

6.5 LIST OF PREPARERS

TABLE 6.5-1
LIST OF BLM PREPARERS

Name	Title	Planning Role
Stephanie Howard	Environmental Coordinator	NEPA Coordination, Air Quality, Socioeconomics
Jason West	Outdoor Recreation Planner	Areas of Critical Environmental Concern, Recreation, Visual Resources, Wild and Scenic Rivers
Cameron Cox	Archaeologist	Cultural Resources
James Hereford II	Natural Resource Specialist	Floodplains, Surface Water Quality, Wetlands / Riparian Zones
Steven Strong	Natural Resource Specialist	Soils
Robin L. Hansen	Petroleum Engineer	Paleontology, Ground Water Quality
Cindy McKee	Realty Specialist	Lands / Access
Clayton Newberry	Botanist	Invasive Plants / Noxious Weeds, Threatened, Endangered or Candidate Plant Species, Vegetation
Aaron Roe	Botanist	Invasive Plants / Noxious Weeds, Threatened, Endangered or Candidate Plant Species, Vegetation
Jessica Brunson	USFWS Botanist	Invasive Plants / Noxious Weeds, Threatened, Endangered or Candidate Plant Species, Vegetation
Brandon McDonald	Wildlife Biologist	Threatened, Endangered or Candidate Animal Species
Stan Olmstead	Natural Resource Specialist	Livestock Grazing, Rangeland Health Standards and Guidelines
David Palmer	Forester	Woodland / Forestry
Elizabeth Gamber		Geology, Paleontology
Craig Newman	Natural Resource Specialist	Livestock Grazing, Rangeland Health Standards and Guidelines
Alec Bryan	Natural Resource Specialist	Livestock Grazing, Rangeland Health Standards and Guidelines

TABLE 6.5-2
LIST OF NON-BLM PREPARERS

Name	Title	Firm	Project Role
Dawn Martin	Project Manager	Kleinfelder	NEPA Coordination, Oversight and Quality Control
Karen Simpson	Deputy Project Manager	Kleinfelder	NEPA Coordination, Document Review, Technical Editing
Dustin Collins	Deputy Project Manager / Air Quality Manager	Kleinfelder	Air Quality
Nicole Peace	GIS Manager	Kleinfelder	GIS Coordination, Oversight and Quality Control
Michele Steyskal	Senior Air Quality Specialist	Kleinfelder	Air Quality
Russ Erbes	Senior Air Quality Specialist	Kleinfelder	Air Quality
Jean Nitchske-Sinclear	NEPA Resource Specialist	Kleinfelder	Paleontology, Livestock Grazing
Bruce Curtis	Senior Water Resource Specialist	Kleinfelder (former Kleinfelder employee)	Water Resources
Terry Farmer	NEPA Resource Specialist	Kleinfelder (former Kleinfelder employee)	Socioeconomics, Recreation, Visual Resources, Land Use and Transportation
Elyssa Figari	Cultural Resource Specialist	Kleinfelder	Cultural Resources
Ashley Smith	Environmental Scientist	Kleinfelder	Soils and Geological Resources
Joseph (Cale) Wharry	NEPA Resource Specialist	Kleinfelder	Wildlife, Vegetation, Noxious Weeds, Special Status Plant Species, and Document Review
Kaitlin Mezaros	Air Quality Specialist	Kleinfelder	Air Quality
Alex Leonard	GIS Specialist	Kleinfelder	GIS Mapping and Analysis
Briana McDavid	GIS Specialist	Kleinfelder	GIS Mapping and Analysis
Sheri Ovitt	Word Processor	Kleinfelder	Document Formatting and Preparation

7.0 ACRONYMS, GLOSSARY, AND REFERENCES

7.1 ACRONYMS AND ABBREVIATIONS

^{o}	Degrees
3-D	Three-dimensional
-A-	
AADT	Average Annual Daily Traffic
ACEC	Area of Critical Environmental Concern
ACEPM	Applicant-Committed Environmental Protection Measures
Ac-ft	Acre feet
AHPA	Archaeological and Historic Preservation Act of 1974
amsl	Above Mean Sea Level
ANC	Acid Neutralization Capacity
AO	Authorizing Officer
APD	Application for Permit to Drill
APE	Area of Potential Effect
AQIA	Air Quality Impact Assessment
AQRV	Air Quality Related Values
AQTSD	Air Quality Technical Support Document
ARMS	Air Resource Management Strategy
ARPA	Archaeological Resources Protection Act of 1979
AUM	Animal Unit Month
avg.	Average
-B-	
BACT	Best Available Control Technology
bbls	Barrels
BCC	Birds of Conservation Concern
Bcf	Billion Cubic Feet
BHCA	Bird Habitat Conservation Area
bgs	Below Ground Surface
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practices
BOP	Blow-out Preventer
bpd	Barrels per Day
BSC	Biological Soil Crust
BTEX	Benzene, toluene, ethylbenzene and xylene
BWPD	Barrels of Water per Day
-C-	
CAA	Clean Air Act
CA	Conservation Area

CCC	Civilian Conservation Corps
CDP	Census Designated Place
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic feet per Second
CH_4	Methane
CIAA	Cumulative Impact Analysis Area
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COA	Condition of Approval
CS	Species receiving special management under a Conservation Agreement
CSU	Controlled Surface Use
CTB	Centralized Tank Batteries
CWA	Clean Water Act
-D-	
DAQ	Division of Air Quality
DAT	Deposition Analysis Thresholds
DEA	Demographic Economic Analysis
DOI	Department of the Interior
dV	deciview
DWS	Utah Department of Workforce Services
DWSPZ	Utah Drinking Water Source Protection Zone
-E-	
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency
ERMA	Extensive Recreation Management Area
ESA	Endangered Species Act of 1973
ESD	Ecological Site Description
-F-	
F	Fahrenheit
FEIS	Final Environmental Impact Statement
FIP	Federal Implementation Plan
FLM	Federal Land Manager
FLPMA	Federal Land Policy and Management Act
FO	Field Office
FRP	Field Response Plans
ft	Feet
FWKO	Free Water Knock Outs

-G-	
GHGs	Greenhouse Gases
GIS	Geographic Information System
GNB	Greater National Buttes
Gold Book	BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development
GOSP	Gas and Oil Separation Plant
-H-	
HAP	Hazardous Air Pollutant
HCA	Habitat Conservation Area
HCP	Hazard Communication Program
hp	Horsepower
-I-	
IM	Instructional Memorandum
IOPs	Inventory Observation Points
-K-	
kg/ha-yr	kilograms per hectare per year
KCl	Potassium chloride
km	Kilometer
KOSLA	Known Oil Shale Leasing Area
Kw	Soil Water Erosion Potential
-L-	
L	Liter
lek	Sage-grouse Strutting Ground
LNG	Liquefied natural gas
LOP	Life of the Project
LUPAs	Land Use Plan Amendments
-M-	
m	Meter
MACT	Maximum Achievable Control Technology
Mbbl	Million Barrels
MBPA	Monument Butte Project Area
MBTA	Migratory Bird Treaty Act of 1918
Mcf	Thousand cubic feet
MDP	Master Development Plan
MEI	Maximum Exposed Individual
mg	Milligram
mg/L	Milligram Per Liter
MLA	Mineral Leasing Act of 1920
MLE	Maximum Likely Exposure
MMbo	Million Barrels of Oil
MMcf	Million Cubic Feet

MOU	Memorandum of Understanding
MPR	Mineral Potential Report
MSDS	Material Safety Data Sheet
-N-	
NAAQS	National Ambient Air Quality Standards
NaCl	Sodium Chloride
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
Newfield	Newfield Exploration Company
NGL	Natural Gas Liquid
n-hexane	Normal Hexane
NHPA	National Historic Preservation Act
NO_2	Nitrogen Dioxide
N_2O	Nitrous Oxide
NOI	Notice of Intent
NOS	Notice of Staking
NO_X	Oxides of Nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NRS	Natural Resource Specialist
NSO	No Surface Occupancy
NSPS	New Source Performance Standards
NSR	New Source Review
NTL	Notice to Lessees
NWI	National Wetlands Inventory
NWSRS	National Wild and Scenic Rivers System
-O-	
OHV	Off Highway Vehicle
ORV	Outstandingly Remarkable Value
OSHA	Occupational Safety and Health Administration
-P-	
PDO	Property Damage Only
PFYC	Potential Fossil Yield Classification
PHMSA	Pipeline and Hazardous Material Safety Administration
PHPA	Polyacylamide Polymer
PLPCO	Public Lands Policy Coordination Office
PLS	Pure Live Seed
PM_{10} and $PM_{2.5}$	Particulate matter less than 10 or 2.5 microns in aerodynamic diameter
ppb	Parts Per Billion

PPH	Preliminary Priority Habitat
ppm	Parts Per Million
PSD	Prevention of Significant Deterioration
PUP	Pesticide Use Proposal
-R-	
RCRA	Resource Conservation Recovery Act of 1976
RD&D	Research, Development, and Demonstration
REL	Reference Exposure Levels
RfC	Reference Concentrations
RFD	Reasonably Foreseeable Development
RICE	Reciprocating Internal Combustion Engines
RIPRAP	Recovery Implementation Program Recovery Action Plan
RMP	Resource Management Plan
ROD	Record of Decision
RoMANS	Rocky Mountain Atmospheric Nitrogen and Sulfur
ROW	Right-of-Way
RUSLE2	Revised Universal Soil Loss Equation 2
RV	Recreational Vehicle
-S-	
SAR	Sodium Adsorption Ratio
SARA	Superfund Amendments and Reauthorization Act of 1986
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SITLA	State Institutional Trust Lands Administration
SMA	Surface Management Agency
SO_2	Sulfur Dioxide
SPARROW	USGS, Bureau of Reclamation and BLM dissolved-solids water quality model
SPC	Species of Concern (Utah Division of Wildlife Resources)
SPCC	Spill Prevention Control and Countermeasure
SQFI	Scenic Quality Field Inventory (Rating Form)
SQRU	Scenic Quality Rating Units
SR	State Route
SRMA	Special Recreation Management Area
SSA	Sole Source Aquifer
STSA	Special Tar Sands Area
SUA	Surface Use Agreement
SUP	Surface Use Plan
SWD	Salt Water Disposal
SWReGAP	Southwestern Regional Gap Analysis Project
-T-	
Tcf	Trillion Cubic Feet

TDS	Total Dissolved Solids
TL	Timing Limitation
TMDL	Total Maximum Daily Loads
tpy	Tons per Year
TSL	Toxic Screening Level
TSS	Total Suspended Solids
-U-	
UBC	Uniform Building Code
UCRB	Upper Colorado River Basin
UDEQ-DAQ	Utah Department of Environmental Quality - Division of Air Quality
UDEQ-DWQ	Utah Department of Environmental Quality - Division of Water Quality
UDMV	Utah Department of Motor Vehicles
UDOGM	Utah Division of Oil, Gas, and Mining
UDOT	Utah Department of Transportation
UDWQ	Utah Division of Water Quality
UDWR	Utah Division of Wildlife Resources
UEO	Utah Energy Office
UGS	Utah Geological Survey
UIC	Underground Injection Control
UNHP	Utah Natural Heritage Program
UNPS	Utah Native Plant Society
UPDES	Utah Pollutant Discharge Elimination System
UPIF	Utah Partners in Flight
USACE	United States Army Corps of Engineers
USC	United States Code
USCA	United States Code Annotated
USDA	**United States Department of Agriculture**
USDOT	United States Department of Transportation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
-V-	
VCU	Vapor Combustion Unit
VFO	Vernal Field Office
VOC	Volatile Organic Compound
VRI	Visual Resource Inventory
VRM	Visual Resource Management
-W-	
WEPP	Water Erosion Prediction Project
WSR	Wild and Scenic River
WYBC	Western Yellow-billed Cuckoo

7.2 GLOSSARY OF TERMS

-A-	
Abatement	Reduction; often used to describe noise mitigation or dust suppression.
Acre-foot	The volume of liquid or solid required to cover one acre to a depth of one foot, or 43,560 cubic feet; measure for volumes of water, reservoir rock, etc.
Active raptor nest	A nest documented as occupied by a raptor within the 3-year period preceding proposed construction.
Adaptive management	A structured iterative process of robust decision making in the face of uncertainty, with an aim of reducing uncertainty over time via system monitoring.
Adverse impacts	An apparent direct or indirect detrimental effect.
Affected environment	The natural, physical, and human-related environment that is sensitive to changes due to proposed actions; the environment under the administration of a land management agency.
Air dispersion modeling	A complex computer model that calculates ambient concentrations of air pollutants.
Airshed	A part of the atmosphere that responds in a coherent way with respect to the dispersion of emissions.
Alluvial	Pertaining to material or processes associated with transportation or deposition of soil and rock by flowing water (e.g., streams and rivers).
Alluvium	Unconsolidated or poorly consolidated gravel sands and clays, deposited by streams and rivers on riverbeds, floodplains, and alluvial fans.
Ambient	The environment as it exists at the point of measurement and against which changes or impacts are measured. Synonymous with background.
Ambient air quality	The mass of a pollutant in a given volume of air. It is typically measured as micrograms of pollutant per cubic meter of air.
Ambient noise level	Cumulative effect from all noise generating sources in the area.
Ancillary facility	Additional support structures required to develop the mineral resource, including gas compressor facilities, disposal wells, roads, collection pipelines, and electric transmission lines.
Animal Unit Month (AUM)	A standardized measurement of the amount of forage necessary for the sustenance of one cow unit or its equivalent for one month. Approximately 800 pounds of forage.
Anthropogenic	Caused by human or man-made activities.
Antiquities	A general term for archaeological or paleontological resources that are at least 100 years of age. Antiquities tangibly represent or have the potential to yield information on historical or prehistoric cultures, or extinct plants and animals.

Aquifer	A body of rock that is sufficiently permeable to conduct groundwater and to yield quantities of water to wells and springs. A confined aquifer is bounded above and below by impermeable beds or by beds of distinctly lower permeability than that of the aquifer itself; an aquifer containing confined groundwater. An unconfined aquifer has a water table. The confining bed is a body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.
Archaeology	The scientific study of material remains (as fossil relics, artifacts, and monuments) of past human life and activities.
Area of critical environmental concern (ACEC)	Areas within the public lands where special management attention is required to: (1) protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes; or (2) protect life and safety from natural hazards.
Association	Organisms living together in any given combination of environmental conditions.
Atlatl	A tool that uses leverage to achieve greater velocity in dart-throwing and includes a bearing surface that allows the user to temporarily store energy during the throw. It consists of a shaft with a cup or a spur that may be integrated into the weapon or made separately and attached to the butt of a projectile called a dart.
Atmospheric dispersion	The process by which pollutants are transported and vertically mixed in the atmosphere.
Atmospheric stability	A measure of turbulence in the atmosphere. Three general classes of stability include neutral, unstable, and stable. Influenced by vertical temperature gradients and wind profiles.
Attainment area	An area in which the federal and state standards for ambient air quality are being met.
Authorizing officer (AO)	Person designated by the Agency as being in the position to speak for the agency and commit the agency to action.
-B-	
Background (Visual)	The viewing area of a distance zone that lies from a minimum of 3 to 5 miles to a maximum of about 15 miles from a travel route, use area, or other observer position. Atmospheric conditions in some areas may limit the maximum to about 8 miles or increase it beyond 15 miles.
Background values	The environment as it exists at the point of measurement and used as a basis to measure changes or impacts. For the purpose of this EIS, background values apply to air quality, noise, and erosion rates.
Barrel	Volume of water equivalent to 42 gallons of water; approximately 7,758 barrels are equivalent to 1 acre-foot of water.
Baseline	Conditions, including trends, existing in the human environment before a proposed action has started; a benchmark state from which the environmental consequences of an action are forecasted.
Berm	Barrier constructed to confine water or other substances.

Best management practices (BMPs)	A practice or combination of practices determined by the state to be the most effective and practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution or protecting wildlife and landscapes. These types of environmental protection practices are applied to oil and natural gas drilling and production to help ensure that energy development is conducted in an environmentally responsible manner.
Big game	Large species of wildlife such as elk, deer, bighorn sheep, and pronghorn that are commonly hunted for food or sport.
Biological soil crusts (BSCs)	The community of organisms living at the surface of desert soils. Major components are cyanobacteria, green algae, microfungi, mosses, liverworts, and lichens.
Biotic	Pertaining to life and living organisms.
Blowout preventer (BOP)	A series of valves on the drill rig which can close down the well in the event that the drill bit penetrates extreme pressure zones.
Bond	Financial guarantee to ensure compliance with the Mineral Leasing Act, including complete and timely plugging of wells, reclamation of lands or adversely affected surface waters, payment of royalties, assessments, or penalties.
Borehole	The wellbore itself, including the openhole or uncased portion of the well. Borehole may refer to the inside diameter of the wellbore wall, the rock face that bounds the drilled hole.
Brood	Hatchlings in a given nest or being raised by a given female bird.
Browser	An animal that grazes (feeds) on leaves, twigs, and tender shoots of trees or shrubs.
Buffer	A protective area adjacent to an area of concern requiring special attention or protection. In contrast to riparian zones, which are ecological units, buffers can be designed to meet varying management concerns.
-C-	
Candidate Species	Any species included in the Federal Register notice of review that are being considered for listing as threatened or endangered by the U.S. Fish and Wildlife Service.
Carbon dioxide (CO_2)	A non-hydrocarbon, corrosive gas that occurs naturally in the gaseous phase in the natural gas reservoir, or is injected into the reservoir in connection with pressure maintenance, gas cycling, or other secondary or enhanced recovery projects.
Casing	A steel pipe which maintains the opening of a drill hole; the act of installing pipe within a well.
Casing annulus	The space between the wellbore and casing where fluid can flow.
Catalyst	A substance that enables a chemical reaction to proceed at a usually faster rate or under different conditions than otherwise possible.

Cement bond log	A geophysical log which confirms the continuous placement of cement within the annulus of the well, to isolate the formation of interest, and to prevent commingling of different aquifers around the casing.
Central gas processing plant	A centralized site where gas compression occurs prior to transport in gas delivery lines.
Characteristic landscape	The established landscape within an area being viewed. The term does not necessarily mean a naturalistic character but may refer to features of the cultural landscape, such as a farming community, an urban landscape, or other landscape that has an identifiable character.
Cist	A prehistoric tomb, box, or chest made of stone slabs or hollowed out of rock that was used for storage of food and other items.
Clean Air Act	Public Law 84-159, established July 14, 1955, and amended numerous times since. The Clean Air Act establishes Federal standards for air pollutants emitted from stationary and mobile sources; authorizes states, tribes and local agencies to regulate polluting emissions; requires those agencies to improve air quality in areas of the country which do not meet Federal standards; and to prevent significant deterioration in areas where air quality is cleaner than those standards. The Act also requires that all Federal activities (either direct or authorized) comply with applicable local, state, tribal and Federal air quality laws, statutes, regulations, standards and implementation plans. In addition, before these activities can take place in non-attainment or maintenance areas, the Federal agencies must conduct a Conformity Analysis (and possible Determination) demonstrating the proposed activity will comply with all applicable air quality requirements.
Closed	Generally denotes that an area is not available for a particular use or uses; refer to specific definitions found in law, regulations, or policy guidance for application to individual programs.
Closed-loop drilling system	A pitless drilling system where all drilling fluids and cuttings are contained at the surface within piping, separation equipment and tanks.
Code of Federal Regulations (CFR)	The official legal tabulation or regulations directing federal government activities.
Colluvial	Consisting of a mixture of soil and angular fragments of rock that have accumulated at the foot and on slopes of mountainsides under the influence of gravity.
Colluvium	A mixture of soil and angular fragments of rock which have accumulated at the foot and on slopes of mountainsides under the influence of gravity.
Community	An assembly of plants living together, reflecting no particular ecological status.
Community types (vegetation)	A group of plants living in a specific region under relatively similar conditions.
Completion	A generic term used to describe the assembly of downhole tubulars and equipment required to enable safe and efficient production from an oil or gas well.
Compressor (units)	Equipment (electrically or diesel-driven) used to increase the pressure on the produced gas to move it into transmission lines or into storage.

Compressor station	A facility consisting of one or more compressor engines, auxiliary treatment equipment, and pipeline installations to pump natural gas under pressure over long distances.
Condensate	A low-density liquid hydrocarbon phase that generally occurs in association with natural gas. Its presence as a liquid phase depends on temperature and pressure conditions in the reservoir allowing condensation of liquid from vapor.
Conditions of Approval (COAs)	Conditions or provisions (requirements) under which an Application for Permit to Drill or a Sundry Notice is approved.
Conglomerate	A sedimentary rock comprised of an unstratified mixture or stratified layers of cobbles, gravel, and sand.
Coniferous	Referring to a cone-bearing, usually evergreen, tree.
Consumptive water use	Total amount of water used by vegetation, human activities, and evaporation of surface water. This includes water used in manufacturing, agriculture, and food preparation that is not returned to a stream, river, or water treatment plant.
Contrast	Opposition or unlikeness of different forms, lines, colors, or textures in a landscape.
Contrast rating	A method of analyzing the potential visual impacts of proposed management activities.
Cooperating Agency (CA)	An entity that assists the lead federal agency in developing an EIS. These can be any agency with jurisdiction by law or special expertise for proposals covered by NEPA (40 CFR 1501.6). Any tribe or Federal, State, or local government jurisdiction with such qualifications may become a CA by agreement with the lead agency.
Core conservation area	The habitat area that would be necessary for recovery of a particular species. Some species have existing designated core conservation areas, whereas for other species, core conservation areas may be under development or proposed.
Council on Environmental Quality (CEQ)	An advisory council to the President of the US established by the National Environmental Policy Act of 1969. It reviews federal programs to analyze and interpret environmental trends and information.
Cover	That part of the environment (living or dead) used by animals for resting, feeding, nesting, and protection.
Cover type	The part of the environment or landscape characterized by a predominant plant community.
Criteria pollutants	Air pollutants for which the EPA has established State and National Ambient Air Quality Standards (NAAQS). These include particulate matter (PM_{10}), nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), and volatile organic compounds (VOCs).

Critical habitat	Habitat that has been deemed essential for the conservation of a threatened, endangered, or candidate species, and that may require species management and protection under Section 4 of the ESA.
Cross-bedded	Arrangement of laminations of strata transverse to the main planes of stratification.
Crucial habitat	Lands on which wildlife or plant species not federally listed as threatened or endangered depend for survival. No alternative suitable habitat is available because of some site limiting factor(s).
Crucial range (Seasonal habitat)	Any particular seasonal range or habitat component that is documented as the determining factor in a big games species' ability to sustain a viable population. A viable population is defined as the species' capability to maintain and reproduce itself at a certain population level specific to that species. Examples include winter range or year-long substantial.
Cubic foot	The volume of gas contained in one cubic foot of space at a standard pressure base of 14.7 psi and a standard temperature base of 60 degrees Fahrenheit.
Cultural modification	Any man-caused change in the landform, water form, vegetation, or the addition of a structure, which creates a visual contrast in the basic elements (form, line, color, texture) of the naturalistic character of a landscape.
Cultural resources	Nonrenewable elements of the physical and human environment including archeological remains (evidence of prehistoric or historic human activities) and sociocultural values traditionally held by ethnic groups (sacred places, traditionally utilized raw materials, etc.).
Cultural site	Any location that includes prehistoric and/or historic evidence of human use or that has important sociocultural value.
Cumulative impacts	As defined by 40 CFR 1508.7, those impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.
-D-	
Decibels (dBA)	The measurement unit commonly used to describe sound levels. The A-weighted decibel (dBA) scale is a logarithmic function that emphasizes the audio frequency response curve audible to the human ear and thus more closely describes how one perceives sound.
Deciview (dV)	A unit of measure for visibility. The deciview index was developed as a linear perceived visual change.
Decommissioning	Generally, the removal of a facility or piece of equipment from service, or a change in status from active to inactive.
Demographic	Pertaining to the study of human population characteristics including size, growth rates, density, distribution, migration, birth rates, and mortality rates.

Development well	A well drilled within the known or proven productive area of an oil field with expectation of producing oil or gas from the producing reservoir.
Direct effects	As defined by 40 CFR 1508.9, these are effects, which are caused by the action and occur at the same time and place as the action; Synonymous with direct impacts.
Directional drilling	The intentional deviation of a wellbore from vertical to reach subsurface areas off to one side from the drilling site.
Discharge	The volume of water flowing past a point per unit time, commonly expressed as cubic feet per second (cfs), gallons per minute (gpm), or million gallons per day (mgd).
Dispersed recreation	A general term referring to recreation use outside the developed recreation sites. This includes activities such as scenic driving, hunting, hiking, OHV use, and biking.
Disposal well	Any well used for the disposal of air, gas, water or other substance into any underground stratum.
Dissolved solids	The portion of solids in water that can pass through a 0.45-micron filter.
Disturbance	An event that changes the local environment by removing organisms or opening up an area, facilitating colonization by new, often different, organisms.
Disturbed area	Area where natural vegetation and soils have been removed or disrupted.
Diversity	The distribution and abundance of different plant and animal communities and species within the area.
Domestic water use	Water for household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Also called residential water use. The water may be obtained from a public supply or may be self-supplied.
Drainage	Natural channel through which water flows at some time of the year. Natural and artificial means for effecting discharge of water as by a system of surface and subsurface passages.
Drill bit	The cutting devise used to drill a well. It is typically made of hardened steel and may have industrial grade diamond components.
Drill rig	The machine used to drill a wellbore. The rig includes virtually everything except living quarters. Major components of the rig include the mud tanks, the mud pumps, the derrick or mast, the draw works, the rotary table or top drive, the drill string, the power generation equipment, and auxiliary equipment.
Drilling fluids	A mixture of water, guar gel, sand, and pH and bacterial control chemicals used in the development of a well for fluid extraction.
Drilling mud	The circulating fluid used to bring cuttings out of the well bore, cool the drill bit, provide hole stability, and maintain pressure control. Drilling mud includes a number of additives to maintain the mud at desired viscosities and weights. Some additives which may be used are caustic, toxic, or acidic.
-E-	

Earthquake	Sudden movement of the earth's crust resulting from faulting, volcanism, or other mechanisms.
Ecosystem	An interacting system of organisms considered together with their environment for example, marsh, watershed, and stream ecosystems.
Effects	Environmental consequences as a result of a proposed or alternative action. They include: 1) direct effects, which are caused by the action and occur at the same time and place; and 2) indirect effects, which are caused by the action and occur later in time or are further removed in distance but which are still reasonably foreseeable. Also referred to as impacts.
Emission	Air pollution discharge into the atmosphere, usually specified by mass per unit time.
Endangered species	A plant or animal species whose prospects for survival and reproduction are in immediate jeopardy, as designated by the Secretary of the Interior, and as further defined by the Endangered Species Act.
Endemic	Confined naturally to a particular geographic area.
Environment	The aggregate of physical, biological, economic and social factors affecting organisms in an area.
Environmental Impact Statement (EIS)	A detailed written statement required by the National Environmental Policy Act when an agency proposes a major federal action significantly affecting the quality of the human environment.
Environmental justice	Executive Order 12898 (February 11, 1994) mandates Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.
Eocene	A period of geologic time from 55.8 million and 33.9 million years before present. The Eocene epoch followed the Paleocene epoch and preceded the Oligocene epoch.
Ephemeral stream	A drainage area, channel, or stream that has no base flow. Water that flows for a short time each year but only in direct response to a runoff event (for example, rainfall or snowmelt).
Erosion	Detachment or movement of soil or rock fragments by water, wind, ice, or gravity. Accelerated erosion is much more rapid than normal, natural, or geologic erosion, primarily as a result of the influence of activities of man, animals, or natural catastrophes.
Evaporative transpiration	The process of transferring water to the atmosphere through evaporation of water and transpiration from plants.
Exception	A case to which a rule or general principal does not apply; a thing different from or treated differently from others of the same class; omission; exclusion.

Exploration	The search for economic deposits of minerals, ore, and other materials through practices of geology, geochemistry, geophysics, drilling, and/or mapping.
Exploratory well	A well drilled in an area where no oil or gas production exists in an effort to discover oil or gas deposits.
Extensive Recreation Management Areas (ERMA)	These are areas where dispersed recreation is encouraged and where visitors have a freedom of recreational choice with minimal regulatory constraint.
Extirpated	A wildlife species that no longer exists.
-F-	
Fault	A fracture in bedrock along which there has been vertical and/or horizontal movement caused by differential forces in the earth's crust.
Fauna	All animal life associated with a given habitat.
Fawning habitat	An area where big game animals usually give birth during a specific time of year.
Federal Land Policy and Management Act of 1976 (FLPMA)	Federal Land Policy and Management Act of 1976 (FLPMA): Public Law 94-579. October 21, 1976, often referred to as the BLM's "Organic Act," which provides the majority of the BLM's legislated authority, direction, policy, and basic management guidance.
Federal Register	A daily publication that reports Presidential and Federal Agency documents and announcements.
Fisheries	Streams and lakes used for fishing.
Fisheries habitat	Streams, lakes, and reservoirs that support fish.
Flaring	The controlled burning of natural gas at a well head that cannot be processed for sale or use because of technical or economic reasons.
Floodplain	That portion of a river valley, adjacent to the channel, which is built of recently deposited sediments and is covered with water when the river overflows its banks at flood stages.
Floristic	All plant life associated with a given habitat.
Fluid minerals	Oil, gas, coal bed natural gas, and geothermal resources.
Fluvial	Of, relating to, or living in a stream or river; produced by the action of a stream.
Footprint	The actual surface area physically disturbed by oil and gas operations and ancillary facilities.
Forage	Vegetation used for food by wildlife, particularly big game wildlife and domestic livestock.
Forb	A broad-leaved flowering plant.
Fossil	Mineralized or petrified form from a past geologic age, especially from previously living things.

Freeboard	The vertical distance between the normal maximum level of the water surface in a channel, reservoir, tank, canal, etc., and the top of the sides of a levee, dam, etc., which is provided so that waves and other movements of the liquid will not overtop the confining structure.
Fugitive dust	Dust that is not emitted from definable point sources such as industrial smokestacks. This particulate matter can be become airborne and escape the general vicinity of an area where activity is occurring. Dust can be generated by construction traffic, surface clearing operations etc., and can then by carried by wind into the air, creating a plume that may be visible from greater distances than the activity directly causing the dust.
-G-	
Gas production facility	All storage, separation, treating, dehydration, power supply, compression, pumping, metering, monitoring, flowline, and other equipment directly associated with gas wells.
Generating station	A facility built to produce electricity for a phased field-wide electrification system.
Geographic information system (GIS)	A computer system capable of storing, analyzing, and displaying data and describing places on the earth's surface.
Geomorphology	The study of landforms.
Gilsonite	A form of natural asphalt found in large amounts only in the Uintah Basin of Utah. Discovered in the 1860s, it was first marketed as a lacquer, electrical insulator, and waterproofing compound about 25 years later by Samuel H. Gilson.
Grade	A slope stated in terms of feet per mile or as feet per feet (percent); the content of precious metals per volume of rock (ounces per ton).
Grazing allotment	A unit of land suitable and available for livestock grazing that is managed as one grazing unit.
Greenhouse gas (GHG)	A gas in an atmosphere that absorbs and emits radiation within the thermal infrared range; naturally occurring GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NO_2), and ozone (O_3).
Groundwater (Confined and Unconfined)	All subsurface water, especially that as distinct from surface water portion in the zone of saturation. Confined groundwater is under pressure substantially greater than atmospheric throughout, and its upper limit is the bottom of a bed of distinctly lower permeability than that of the material in which the confined water occurs. Unconfined groundwater is water in an aquifer that is under atmospheric pressure and is considered under water table conditions.
Guidelines	Actions or management practices that may be used to achieve desired outcomes, sometimes expressed as BMPs.

-H-	
Habitat	The place or type of site where a plant or animal naturally or normally lives and grows. Includes all biotic, climatic, and soils conditions, or other environmental influences affecting living conditions.
Habitat diversity	The distribution and abundance of different plant and animal communities and species within a specific area.
Habitat fragmentation	The process by which habitats are increasingly subdivided into smaller units, resulting in their increased isolation as well as loss of total habitat area.
Habitat type	A land or aquatic unit consisting of an aggregation of habitats having equivalent structure, function, and responses to disturbance.
Hazardous air pollutants (HAPs)	Pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental impacts. The EPA has classified 189 air pollutants as HAPs.
Herbaceous	Plant strata that have little or no woody tissue and persist usually for a single growing season.
Holocene	An epoch of the Quaternary period from about 10,000 years ago to present; sometimes referred to as “recent.”
Horizontal drilling	The drilling of an oil or natural gas well at a vertical angle, which allows a well to run parallel to a formation containing oil or gas.
Hydraulic fracturing	A method of stimulating well production by increasing the permeability of the producing formation. Fracture fluids which include propping agents such as sand or glass beads are pumped into the formations under extremely high hydraulic pressure. The propping agents facilitate the formation of channels to release water and gas into the well.
Hydrocarbon	An organic compound consisting entirely of hydrogen and carbon that are found in petroleum, natural gas, coal, and asphalt.
Hydrocyclone	A stationary device that uses centrifugal force to separate the heavy and light components of liquids.
Hydrogen sulfide (H_2S)	A flammable, poisonous, corrosive gas with an odor suggestive of rotten eggs, which can occur naturally in the gaseous phase in natural gas reservoirs.
Hydrology	A science that deals with the properties, distribution, and circulation of surface and subsurface water.
Hydrostatic testing	Testing of the integrity of a newly placed, but uncovered pipeline for leaks. The pipeline is filled with water, pressurized to operating pressures, and visually inspected.

-I-	
Impact	A modification of the existing environment caused by an action. These environmental consequences are the scientific and analytical basis for comparison of alternatives. They include: 1) direct effects, which are caused by the action and occur at the same time and place; and 2) indirect effects, which are caused by the action and occur later in time or are further removed in distance but which are still reasonably foreseeable or cumulative. A synonym for "effect."
Impairment	A classification of poor water quality for a surface water body under the Clean Water Act.
Impoundment	The accumulation of any form of water in a reservoir or other storage area.
Indian Country	Any of the many self-governing Native American communities throughout the US. Legally categorized as (a) all land within the limits of any Indian reservation under the jurisdiction of the United States Government; (b) all dependent Indian communities within the borders of the United States ; and (c) all Indian allotments.
Indirect effects	Effects, which are caused by the action and occur later in time or are further removed in distance but which are still reasonably foreseeable. Indirect effects may include reduced reproduction, population density or growth rate in wildlife. Other effects may be related to induced changes in the patterns of land use and effects on air, water, and other natural systems, including ecosystems (40 CFR 1508.8). Synonymous with indirect impacts.
Infiltration	The movement of water or some other liquid into the soil or rock through pores or other openings.
Infrastructure	The basic framework or underlying foundation of a community including road networks, electric and gas distribution, water and sanitation services, and facilities.
Injection well	A well in which fluids are injected rather than produced, the primary objective typically being to maintain reservoir pressure. Two main types of injection are gas and water.
Interbedded	Rock beds that lie within rock beds of different material.
Interdisciplinary team (IDT)	A group of individuals with different training, representing the physical sciences, social sciences, and environmental design arts, that are assembled to solve a problem or perform a task. The members of the team collaborate with frequent interaction to develop a solution so that each discipline may provide insights to any stage of the problem and disciplines may combine to provide new solutions. The number and disciplines of the members vary with circumstances. A member may represent one or more disciplines or BLM program interests.
Intermittent stream	A stream which flows only at certain times of the year when it receives water from alluvial groundwater, springs, or some surface source such as melting snow in mountainous areas.

Inventory Observation Point (IOP)	That portion of the Visual Resource Inventory (VRI) process, which is either an important viewpoint or representative of the scenic quality rating unit being evaluated for scenic quality
Invertebrates	All animals without vertebrae.
Irretrievable	Applies to the loss of production, harvest, or use of natural resources. For example, some or all of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. The production lost is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume timber production.
Irreversible	Applies primarily to the use of nonrenewable resources, such as minerals or cultural resources, or to those factors that are renewable only over long time spans, such as soil productivity and aspen regeneration. Irreversible also includes loss of future options.
-L-	
Lacustrine	Pertaining to lakes. Lacustrine sediments are deposited in lakes.
Lambing areas	An area where sheep deliver and nurse young during a specific time of year.
Landform	Any physical, recognizable form or feature of the Earth's surface, having a characteristic shape and produced by natural causes. Includes major features such as plains, plateaus, and mountains, and minor features, such as hills, valleys, slopes, canyons, arroyos, and alluvial fans.
Landscape character	The arrangement of a particular landscape as formed by the variety and intensity of the landscape features and the four basic elements of form, line, color, and texture. These factors give the area a distinctive quality, which distinguishes it from its immediate surroundings.
Landscape features	The land, water, vegetation, and structures that compose the characteristic landscape.
Leasable minerals	Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. They include coal, phosphate, sulphur, potassium, and sodium minerals, and oil, gas, and geothermal.
Lease	A legal document that conveys to an operator the right to drill for oil, gas; the tract of land on which a lease has been obtained.
Lease notice	A document that provides more detailed information concerning limitations that already exist in law, lease terms, regulations, and operational orders. A Lease Notice also addresses special items the lessee would consider when planning operations but does not impose new or additional restrictions.
Lease stipulation	A modification of the terms and conditions on a standard lease form at the time of the lease sale.
Lek	An assembly area where birds, especially sage grouse, carry on display and courtship behavior.
Limestone	A sedimentary rock composed primarily of calcium carbonate.

Line	The path, real or imagined, that the eye follows when perceived abrupt differences in form, color, or texture. Within landscapes, line may be found as ridges, skylines, structures, changes in vegetative types, or individual trees and branches.
Lithic scatter	A surface scatter of cultural artifacts and debris that consists entirely of lithic (i.e., stone) tools and chipped stone debris. This is a common prehistoric site type that contrasts to a cultural material scatter (which contains other or additional artifact types such as pottery or bone artifacts), to a camp (which contains habitation features, such as hearths, storage features or occupation features), or to other site types that contain different artifacts or features.
Locatable minerals	Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Law of 1872, as amended. This includes deposits of gold, silver, and other uncommon minerals not subject to lease or sale.
Long-term impacts	Effects that persist beyond the construction, drilling, and reclamation phases of an oil and gas project, or continue for the LOP. For the purpose of this EIS analysis, long-term effects generally last five (5) years or more.
-M-	
Mahogany Oil Shale Zone	The Mahogany Zone (Parachute Member) in the Piceance Creek Basin consists of kerogen-rich strata and averages 100 to 200 feet thick. This zone extends to all margins of the basin and is the richest oil shale interval in the stratigraphic section.
Mesic	A habitat characterized by moderate moisture and temperature conditions and by a profusion of plant life.
Methane (CH_4)	The simplest hydrocarbon; natural gas is nearly pure methane.
Middleground	Area located from 0.25–0.50 to 3–5 miles from the viewer.
Mil	A unit of length equal to one thousandth (10-3) of an inch (0.0254 mm); typically used to specify the thickness of plastic sheeting.
Mineral estate	The ownership of minerals, including rights necessary for access, exploration, development, mining, ore dressing, and transportation operations.
Mineral reserves	Known mineral deposits that are recoverable under present conditions but are as yet undeveloped.
Mineral withdrawal	A formal order that withholds federal lands and minerals from entry under the Mining Law of 1872 and closes the area to mineral location (staking mining claims) and development.
Minimize	To reduce the adverse impact of an operation to the lowest practical level.
Mitigation, Mitigate	Avoiding, minimizing, reducing, eliminating, rectifying, or compensating for impacts to resources from an action (see 40 CFR 1508.8). To lessen the severity.
Mitigation measures	Methods or procedures that reduce or lessen the adverse impacts of an action.
Modification	The making of a limited change in something; the result of such a change.

Monitor	To systematically and repeatedly watch, observe, or measure environmental conditions in order to track changes.
Mudstone	A hardened sedimentary rock consisting of clay. It is similar to shale but lacks distinct layers.
-N-	
National Ambient Air Quality Standards (NAAQS)	The allowable concentrations of air pollutants specified by the federal government. The air quality standards are divided into primary standards (based on the air quality criteria and allowing an adequate margin of safety and requisite to protect the public health) and secondary standards (based on the air quality criteria and allowing an adequate margin of safety and requisite to protect the public welfare from any unknown or expected adverse effects of air pollutants).
National Environmental Policy Act of 1969 (NEPA)	An act that encourages productive and enjoyable harmony between man and his environment and promotes efforts to prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; enriches the understanding or the ecological systems and natural resources important to the Nation;, and establishes the CEQ.
National Register of Historic Places (NRHP)	A list of areas maintained by the National Park Service that have been designated as being of historical significance.
Native species	Plants that originated in the area in which they are found (i.e., they naturally occur in that area).
Natural gas	Those hydrocarbons (other than oil and other than natural gas liquids separated from natural gas), which occur naturally in the gaseous phase in the reservoir and are produced and recovered at the wellhead in gaseous from. Natural gas includes coalbed methane gas.
Night lighting	Lights used to illuminate facilities for work or safety. These lights can be mounted on poles, buildings, other equipment and fences. The lighting can consist of two types: area and accent. Area lighting provides general illumination over a broad zone for safety, while accent lighting provides concentrated illumination for work areas, doorways, pathways, stairs and other areas that require distinction.
No Surface Occupancy (NSO)	A fluid minerals leasing constraint that prohibits occupancy or disturbance on all or part of the lease surface to protect special values or uses. Lessees may exploit the fluid mineral resources under the leases restricted by this constraint through use of directional drilling from sites outside the area.
Noise	Unwanted sound; one that interferes with one's hearing of something; a sound that lacks agreeable musical quality or is noticeably unpleasant.
Nonattainment	The EPA's designation for an air quality control region (or portion thereof) in which ambient air concentrations of one or more criteria pollutants exceed NAAQS.
Non-consumptive use	Water withdrawn for use that is not consumed. This includes water used for hydropower generation, recreation, and in-stream flow.
Noxious weeds	A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic;

	a carrier or host of serious insects or disease; or nonnative, new, or not common to the United States. Also known as "invasive" weeds.
Numic	A branch of the Uto-Aztecan language family which includes seven languages spoken by Native American peoples traditionally living in the Great Basin, Colorado River basin, and southern Great Plains.
-O-	
Occupied habitat	Any area within 300 feet of a listed plant individual.
Off-highway vehicle (OHV)	Any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding: (1) any non-amphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the authorized officer, or otherwise officially approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used in times of national defense emergencies.
One-hundred (100)-year flood	A hydrologic event with a magnitude that has a recurrence interval of 100 years.
Operator	Any person who has taken formal responsibility for the operations conducted on the leased lands.
Outcrop	Rock strata exposed at the surface.
Outstanding Remarkable Values (ORVs)	A unique, rare, or exemplary feature of a river that is significant at a comparative regional or national level. The value may be scenic, recreational, geological, fish-related, wildlife-related, historic, cultural, botanical, hydrological, paleontological, scientific, or other value.
Ozone	A molecule containing three oxygen atoms (O_3) produced by passage of an electrical spark through air or oxygen (O_2).
-P-	
Paleontological resources (fossils)	The physical remains of plants and animals preserved in soils and sedimentary rock formations. Paleontological resources are important for understanding past environments, environmental change, and the evolution of life.
Parturition areas	Documented birthing areas commonly used by females. These areas may be used as nursery areas by some big game species.
Perennial stream	A stream or reach of a stream that flows throughout the year.
Perennial vegetation	A plant whose life-cycle lasts longer than two years. Although the tops of herbaceous perennials die down at the end of the growing season, buds, roots, and underground portions of the plant persist.
Permeability	The capacity of a soil or groundwater aquifer to transmit water.
Petroglyphs	Images created by removing part of a rock surface by incising, pecking, carving, and abrading.
pH	A measure of the acidity or alkalinity of an aqueous solution and defined as the negative logarithm of the hydrogen-ion concentration. pH values range from 0 to

	14 and are dimensionless. A pH of 7 represents a neutral solution, a pH above 7 indicates an alkaline solution, and a pH below 7 indicates an acidic solution.
Physiographic province	An extensive portion of the landscape normally encompassing many hundreds of square miles that portrays similar qualities of soil, rock, slope, and vegetation of the same geomorphic origin.
Physiography	The study and classification of the surface features of the earth. Pertains to the genesis and evolution of landforms.
Pictograph	A graphic painted character used in picture writing.
Pipe stringing	Linking casing together to form a continuous string to the target formation. Twenty-foot lengths of casing are screwed and/or welded together.
Plant association	The basic unit of vegetation classification representing a plant community containing a defined flora, composition, and uniform habitat conditions.
Plant community	A group of plants that occupy a given locale.
Pleistocene	A period of geologic time from 2.588 million to 12,000 years before present. Of or belonging to the geologic time, rock series, or sedimentary deposits of the earlier of the two epochs of the Quaternary Period, characterized by the alternate appearance and recession of northern glaciation, the appearance and worldwide spread of hominids, and the extinction of numerous land mammals, such as the mammoths, mastodons, and saber-toothed tigers.
Plug and Abandon (P & A)	Plug and abandon is (1) the proper plugging and abandoning of a well in compliance with all applicable regulations, and the cleaning up of the well site to the satisfaction of any governmental body having jurisdiction with respect thereto and to the reasonable satisfaction of the operator; (2) to cease efforts to find or produce from a well or field; and (3) to plug a well completion and salvage material and equipment.
PM_{10}	Airborne suspended particles with an aerodynamic diameter of 10 microns or less.
$PM_{2.5}$	Airborne suspended particles with an aerodynamic diameter of 2.5 microns or less.
Porosity	The voids or openings in geological materials.
Potential habitat	An area that satisfies the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.
Prevention of Significant Deterioration (PSD)	A regulatory program under the Clean Air Act (P.L. 84-159, as amended) to limit air quality degradation in areas currently achieving the National Ambient Air Quality Standards. The PSD program established air quality classes in which differing amounts of additional air pollution are allowed above a legally defined baseline level. Almost any additional air pollution would be considered significant in PSD Class I areas (certain large National Parks and Wilderness Areas in existence on August 7, 1977). PSD Class II areas allow that deterioration associated with moderate, well-controlled growth (most of the country). Although Class III areas would generally allow planned individual growth, no Class III areas have been established.
Produced water	Formation water pumped during the development of a gas well.

Producing well	A well drilled in a known field that produces oil or gas.
Productivity	In reference to vegetation, productivity is the measure of live and dead accumulated plant materials.
Project Area	The area of land upon which an operator conducts mining operations, including the area needed for building or maintaining of roads, transmission lines, pipelines, or other means of access.
Protohistoric	The period or stage of human development or of a particular culture immediately prior to the emergence of writing. The transitional period between history and prehistory.
-R-	
Rangeland health	The degree to which the integrity of the soil and ecological processes of rangeland ecosystems are sustained.
Rangelands	Typically non-irrigated lands managed primarily for grazing cattle, sheep, goats, horses, etc.
Raptor	Bird of prey with sharp talons and strongly curved beaks such as hawks, owls, vultures, and eagles.
Reasonably foreseeable development (RFD)	The prediction of the type and amount of oil, gas, and other mineral activity that would occur in a given area and would contribute to significant cumulative effects on the resources of concern. The prediction is based on geologic factors, past history of drilling, projected demand for oil and gas, and industry interest.
Recharge	Replenishment of the water supply in an aquifer through the outcrop or along fracture lines.
Reclamation	The process of restoring disturbed areas using any of following methods (for example, recontouring, spreading topsoil or growth medium, seeding, and planting).
Recontouring	Restoration of the natural topographic contours by reclamation measures, particularly in reference to roads.
Record of Decision (ROD)	A document signed by a responsible official recording a decision that was preceded by the preparing of an environmental impact statement.
Recreation Management Areas	Units within a planning area that guide recreation management on public lands and have similar recreation related issues and concerns. There are two types of recreation management areas. Extensive Recreation Management Areas (ERMA): These are areas where dispersed recreation is encouraged and where visitors have a freedom of recreational choice with minimal regulatory constraint. Special Recreation Management Areas (SRMA): These are areas where congressionally recognized recreation values exist or where significant public recreation issues.
Rehabilitation	A management alternative and/or practice that restores landscapes to a desired scenic quality.

Relief	The vertical difference in elevation between the highest and lowest points of a land surface within a specified horizontal distance or in a limited area.
Reserve pit	A pit prepared on a well pad prior to drilling to use for wastewater retention, evaporation, and disposal. Wastewaters will have a fine solids component. Some evaporation ponds are lined with an impermeable liner to keep water from filtering through and contaminating shallow groundwater.
Reserves	Identified resources of mineral-bearing rock from which the mineral can be extracted profitably with existing technology and under present economic conditions.
Revegetation	The reestablishment and development of self-sustaining plant cover following land disturbance. This may occur through natural processes, or the natural processes may be enhanced by human assistance through seedbed preparation, reseeding, and mulching.
Right-of-way (ROW)	A ROW grant is an authorization to use a specific piece of public land for a specific project, such as roads, pipelines, transmission lines, renewable energy, and communication sites. The grant authorizes rights and privileges for a specific use of the land for a specific period of time.
Riparian area	A form of wetland transition between permanently saturated wetlands and upland areas. Riparian areas exhibit vegetation or physical characteristics that reflect the influence of permanent surface or subsurface water. Typical riparian areas include lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams and the shores of lakes and reservoirs with stable water levels. Excluded are ephemeral streams or washes that lack vegetation and depend on free water in the soil.
Rock art	See petroglyphs or pictographs.
Roost	A place where birds customarily rest or sleep.
Royalty	A share of production that is free of the expense of production. It is generally paid by a lessee to a lessor of a mineral lease as part of the terms of the lease.
Runoff	That part of precipitation that appears in surface streams; precipitation that is not retained on the site where it falls and is not absorbed by the soil.
-S-	
Salable minerals	Materials such as common varieties of sand, stone, building stone, gravel, and clay that are not obtainable under the mining or leasing laws but that can be acquired under the Mineral Materials Act of 1947, as amended.
Salinity	The term refers to solids such as sodium chloride (table salt) and alkali metals that are dissolved in water. Equivalent to TDS in non-saltwater areas.
Sandstone	A sedimentary rock composed of mineral grains from 1/16 to 2 millimeters in diameter, bound together by a cement of silica, carbonate, or other minerals or a matrix of clay minerals.
Scenic quality	The relative worth of a landscape from a visual perception point of view.

Scenic quality evaluation key factors	The seven factors (land form, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications) used to evaluate the scenic quality of a landscape.
Scenic Quality Rating Unit (SQRU)	A portion of the landscape which displays primarily homogenous visual characteristics of the basic landscape features (land and water form, vegetation, and structures).
Scenic quality ratings	The relative scenic quality (A, B, or C) assigned a landscape by applying the scenic quality evaluation key factors; scenic quality A being the highest rating, B a moderate rating, and C the lowest rating.
Scoping	The process of identifying the range of issues, management concerns, preliminary alternatives, and other components of an EIS. It involves both internal and public viewpoints.
Section 106 Consultation	The requirement of Section 106 of the National Historic Preservation Act that any project funded, licensed, permitted, or assisted by the Federal Government be reviewed for impacts to significant historic properties and that the State Historic Preservation Officer and the Advisory Council on Historic Preservation be allowed to comment on a project.
Section 404	That section of the Clean Water Act delineating restrictions on dredging and filling of wetlands and disruption of beds and banks of streams.
Section 7 Consultation	The requirement of Section 7 of the Endangered Species Act that all federal agencies consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service if a proposed action might affect a federally listed species or its critical habitat.
Sediment	Soil or rock particles that have been transported to stream channels or other bodies of water. Sediment input can come from natural soil erosion, rock weathering, agricultural practices, or construction activities.
Sediment load	The amount of sediment (sand, silt, and fine particles) carried by a stream or river.
Sedimentary rock	A rock formed by the accumulation and cementation of mineral grains transported by wind, water, or ice to the site of deposition or chemically precipitated at the depositional site.
Sedimentation	The processes of erosion, transportation, and deposition of sediment by water and air. These occur naturally but may be enhanced by human activities such as road and reservoir construction, logging, mining, and livestock grazing.
Seismic	Seismic waves are shock waves or vibrations usually generated by an earthquake. In oil and gas exploration, seismic waves are generated by creating vibrations at the ground surface. These are reflected by the various layers of rock beneath the ground and measured at the surface. Computer analysis enables a cross-section of the rock layers to be constructed thus revealing potential mineral deposits.
Sensitive species	The designation (normally for species other than federally listed, proposed, or candidate species) given to species that occur on BLM-administered lands and that the BLM could significantly affect the conservation status of through management. Sensitive species may include those that 1) could become endangered in or

	extirpated from a state, or within a significant portion of their distribution; 2) are under status review by the Fish and Wildlife Service and National Marine Fisheries Service; 3) are undergoing significant current or predicted downward trends in habitat capability or population or density; 4) typically have small and widely dispersed populations; 5) inhabit specialized or unique habitats; or 6) are state listed but may be better conserved through the application of BLM sensitive species status (see BLM Manual 6840, Special Status Species Management).
Shale	A fine-grained sedimentary rock formed by the consolidation (esp. by compression) of clay, silt, or mud. It is characterized by finely laminated structure (approximately parallel to the bedding) along which the rock breaks readily into thin layers.
Short-term impacts	Effects of short duration that occur during construction, drilling, completion, and reclamation of an oil and gas well. For the purpose of this EIS analysis, short-term impacts are generally defined as those that would last fewer than five (5) years.
Shut-in	Refers to a well that is completed, is shown to be capable of production in paying quantities, and is not presently being operated.
Significant impact	A qualitative term used to describe the anticipated importance of impacts to the human and or the environment as a result of a direct or indirect action (or actions).
Siltstone	A rock composed of silt having the texture and composition of shale but lacking the property to split along planes of weakness into thin sheets.
Slope	The degree of deviation of a surface from the horizontal.
Soil survey	The systematic examination, description, classification, and mapping of soils in an area, usually a county.
Special Status Species	Species that have been proposed for listing or officially listed as threatened or endangered, and species designated as candidates for listing as threatened or endangered under the ESA; state-listed species; and BLM state director–designated sensitive species (see BLM Manual 6840, Special Status Species Management).
Species	The basic category of biological classification intended to designate a single kind of animal or plant.
Species of Special Concern	A native species whose population is low and limited in distribution or has suffered reductions because of habitat loss.
Split-estate lands	Surface land and mineral estate of a given area under different ownerships. Frequently, the surface will be privately owned and the minerals federally owned.
Statistically significant	A difference between samples/responses large enough to be attributed to something other than expected sampling error.
Stipulations	Requirements that are part of the terms of a mineral lease. Some stipulations are standard on all Federal leases. Other stipulations may be applied to the lease at the time of issuance at the discretion of the surface management agency to protect valuable surface resources and uses.
Strata	An identifiable layer of bedrock or sediment; does not imply a particular thickness of rock.

Stratigraphic unit	A body of rocks recognized as a unit in the classification of the rocks of Earth's crust with respect to any specific rock character, property, or attribute or for any purpose such as description, mapping, and correlation.
Stratigraphy	The science of the description, correlation, and classification of rock strata, including the interpretation of the depositional environments of those strata.
Stream gauging	A quantitative determination of stream flow using gages, current meters, or other measuring instruments at selected locations.
Strip topsoil	To salvage a specific depth of topsoil with a scraper, dozer, or grader for use in future revegetation of the site.
Sub-basin	A portion of a river basin that contributes to a watershed.
Substrate	Material consisting of silts, sands, gravels, boulder, and woody debris found on the bottom of a stream channel.
Suitable habitat	Areas that exhibit the specific habitat features necessary for a species' persistence, as determined by field inspection and/or surveys, but that may or may not contain the species.
Surface disturbance	Activities that normally result in more than negligible disturbance to public lands and that accelerate the natural erosive process. These activities normally involve use and/or occupancy of the surface, cause disturbance to soils and vegetation, and are usually caused by motorized or mechanical actions. Surface disturbance may result from activities using earth-moving and drilling equipment; off road vehicle travel; vegetation treatments; the use of pyrotechnics and explosives; and construction of facilities like power lines, pipelines, oil and gas wells, recreation sites, livestock facilities, or new roads. Surface disturbance is not normally caused by casual use. Activities that are not typically surface disturbing include, but are not limited to, proper livestock grazing, cross-country hiking, minimum impact filming, and vehicle travel on designated routes.
-T-	
Tar sands	Also referred to as "oil sand" or "bituminous sand," tar sand is a sedimentary material composed primarily of sand, clay, water (in some deposits) and organic constituents known as bitumen. Processing of tar sands involves separating the bitumen fraction from the inorganic materials and subsequently upgrading the bitumen through a series of reactions to produce a synthetic crude oil feedstock that is suitable for further refining into distillate fuels in conventional refineries.
Target formation	The geological association of rocks which contain the exploitable mineral reserves.
Temperature inversion	An atmospheric condition in which warmer air lies above colder air and is said to have an inverted temperature gradient where temperature increases with altitude.
Territory	An area defended by a male, both members of a pair or an unmated species.
Texture	The visual manifestations of the interplay of light and shadow created by the variations in the surface of an object or landscape.

Threatened species	Any plant or animal species defined under the Endangered Species Act as likely to become endangered within the foreseeable future throughout all or a significant portion of its range; listings are published in the Federal Register.
Three-phase separator	A basin that accommodates the separation of different density fluids, in this case gas and produced water.
Timing limitation (seasonal restriction)	A constraint that limits or prohibits surface use during specified time periods to protect identified resource values. The constraint does not apply to the operation and maintenance of production facilities unless analysis demonstrates that such constraints are needed and that less stringent, project-specific constraints would be insufficient.
Total dissolved solids (TDS)	Total amount of dissolved material, organic or inorganic, contained in a sample of water.
Total suspended solids (TSS)	Amount of undissolved particles suspended in liquid.
Transmission lines	A line used to conduct electricity between two points. Without high voltage transmission lines, generation would have to be located at or near where the energy is used.
Turbidity	A fisheries measurement of the total suspended solids in water expressed as nephelometric turbidity units (NTU).
-U-	
Upland game species	Game birds such as chukar, partridge, ring-necked pheasant, California quail, wild turkey, greater sage-grouse, mourning dove, mountain cottontail rabbit, and desert cottontail rabbit that are commonly hunted for food or sport.
-V-	
Valid existing rights	With respect to oil and gas leases, "valid existing rights" vary from case to case, but generally involve rights to explore, develop, and produce within the constraints of the lease terms, laws and regulations.
Vegetation	All of the plants growing in and characterizing a specific area or region; the combination of different plant communities found there.
Vegetation type	A plant community with distinguishable characteristics described by the dominant vegetation present.
Venting	The release of gas into the atmosphere following well development and prior to successful installation of the collection pipeline system.
Viewshed	The landscape that can be directly seen under favorable atmospheric conditions, from a viewpoint or along a transportation corridor.
Visibility	The ability or inability to view scenic vistas. It is usually characterized by two parameters: visual range (VR) and the light-extinction coefficient (b_{ext}). The VR parameter represents the greatest distance that a large dark object can be seen. The b_{ext} parameter represents the attenuation of light per unit distance due to scattering and absorption by gases and particulate matter in the atmosphere.

Visitor day	A standard measure of visitor use equal to one person visiting a site for 12 hours.
Visual impact	Any modification in landform, water bodies, or vegetation, or any introduction of structures, which negatively interrupts the visual character of the landscape and disrupts the harmony of the basic elements (i.e., form, line, color, and texture).
Visual Resource Management (VRM)	The inventory and planning actions taken to identify visual values and to establish objectives for managing those values. The management actions taken to achieve the visual management objectives.
Visual Resource Management (VRM) Class	One of the four visual management classes (Class I, Class II, Class III, and Class IV) the BLM uses in the VRM system to manage visual resources within its jurisdiction. VRM classes (categories) are assigned to public lands based on scenic quality, sensitivity level, and distance zones. Each class has an objective, which prescribes the amount of change allowed in the characteristic landscape.
Visual Resources	The visible physical features of a landscape (topography, water, vegetation, animals, structures, and other features) that constitute the scenery of an area.
Volatile organic compounds (VOC)	Carbon-based chemical compounds that evaporate quickly (have a high vapor pressure) under atmospheric conditions. Sources include certain solvents, degreasers (benzene), and fuels. VOCs react with other substances (primarily nitrogen oxides) to form ozone. They contribute significantly to photochemical smog production and certain health problems.
-W-	
Waiver	Permanent exemption from a lease stipulation. The stipulation no longer applies anywhere within the leasehold.
Water quality	The chemical, physical, and biological characteristics of water with respect to its suitability for a particular use.
Water right	The right to use water diverted at a specific location on a water source and putting it to recognized beneficial uses at set locations.
Water table	Surface in an unconfined water aquifer at which the pressure is atmospheric. It is defined by the levels at which water stands in wells that penetrate the water body just far enough to hold standing water.
Water-flooding	Methods used to inject produced water and freshwater (through formerly producing or new wells) into the oil-producing geologic formation.
Waterfowl	A bird that frequents water, especially a swimming bird such as a duck or swan.
Waters of the U.S.	Includes 1) all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; 2) all interstate waters including wetlands; 3) all other waters, such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce; 4) all impoundments of waters otherwise defined as Waters of the United States under the definition; 5) tributaries of waters identified in paragraphs (a) (1)-(4) of this section; 6) territorial seas; 7) wetlands

	adjacent to waters (other than waters that are themselves wetlands); 8) Waters of the United States do not include prior converted cropland (33 CFR Part 328).
Watershed	The line of division between two adjacent rivers or lakes with respect to the flow of water by natural channels into them; the natural boundary of a basin.
Well casing	Large-diameter pipe lowered into an openhole and cemented in place. The well designer must design casing to withstand a variety of forces, such as collapse, burst, and tensile failure, as well as chemically aggressive brines. Casing is run to protect fresh-water formations, isolate a zone of lost returns, or isolate formations with significantly different pressure gradients.
Well pad	A temporary drilling site, usually constructed of local materials such as gravel, shell or even wood. After the drilling operation is over, most of the pad is usually removed or contoured.
Wellbore	A synonym for borehole.
Wellhead	The surface termination of a wellbore that incorporates facilities for installing casing hangers during the well construction phase.
Wetlands	Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR Part 328).
Wickiup	A small, temporary dwelling or shelter of grass, brush, etc. over a frame, traditionally used by Indian peoples of the Great Basin and southwestern US.
Wild and Scenic Rivers (WSR) Act	Primary river conservation law enacted in 1968. The Act was specifically intended by Congress to balance the existing policy of building dams on rivers for water supply, power, and other benefits, with a new policy of protecting the free-flowing character and outstanding values of other rivers.
Wildland fire	Any nonstructural fire, other than prescribed fire, that occurs in the wild land.
Wildlife	Any wild plant, mammal, bird, reptile, amphibian, or other aquatic or terrestrial organism.
Winter range	The range that large game animals use in substantial numbers only during winter periods.
Withdrawal	An action that restricts the use of public lands by removing them from the operation of some or all of the public land or mining laws.
Woodland	A forest community occupied primarily by noncommercial species such as juniper, mountain mahogany, or quaking aspen groves; all western juniper forestlands are classified as woodlands, since juniper is classified as a noncommercial species.
Workover	Well maintenance activities which require onsite mobilization of a drill rig to repair the well bore equipment (casing, tubing, rods, or pumps) or the wellhead. In some cases, a workover may involve development activities to improve production from the target formation.
-Z-	

Zone	A slab of reservoir rock bounded above and below by impermeable rock.

7.3 REFERENCES

Advisory Council on Historic Preservation (ACHP). 2004. Protection of Historic Properties (incorporating amendments effective August 5, 2004), 36 CFR 800. Access online at http://www.achp.gov/regs-rev04.pdf.

Alldredge, A.W. and R.D. Deblinger. 1988. *Great Divide Basin Pronghorn Study*. Department of Fisheries and Wildlife, Colorado State University. Fort Collins, Colorado. 137 pp.

Anderson, Paul B., Vanden Berg, Michael, Carney, Stephanie Carney, Morgan, Craig, and Sonja Heuscher. Moderately Saline Groundwater in the Uinta Basin, Utah. 2012.

Anning, D.W., Bauch, N.J., Gerner, S.J., Flynn, M.E., Hamlin, S.N., Moore, S.J., Schaefer, D.H., Anderholm, S.K. and L.E. Spangler. Dissolved Solids in Basin-Fill Aquifers and Streams in the Southwestern United States. U.S. Geological Survey Scientific Investigations Report 2006-5315; 2012.

Ashley Regional Medical Center. 2012. Accessed April 2012 at http://www.ashleyregional.com/.

Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, CA.

_____. 2012. *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*. Edison Electric Institute and APLIC. Washington, D.C.

Baker Hughes Incorporated. 2008. Rig Count Mapping for North America – Uinta Basin. Internet website: http://gis.bakerhughesdirect.com/RigCounts/default2.aspx. Accessed March 2008.

Barfield, B. J., R. C. Warner, and C. T. Hahn, 1981, Applied Hydrology and Sedimentology for Disturbed Areas. Oklahoma Technical Press, Stillwater, Oklahoma, 1981.

Beck, T.D.I. 1977. Sage grouse flock characteristics and habitat selection during winter. *Journal of Wildlife Management* 41:18–26.

Behle, W.H. 1981. The birds of northeastern Utah. Utah Museum of Natural History, Occasional Publ. 2, Univ. of Utah, Salt Lake City. 136 pp.

Belnap, J. And J.S. Gardner. 1993. Soil Microstructure in Soils of the Colorado Plateau: The Role of the Cyanobacterium *Microcoleus vaginatus*. Great Basin Naturalist 53(1): 40-47.

Belnap, J., J. H. Kaltenecker, R. Rosentreter, J. Williams, S. Leonard, and D. Eldridge. 2001. Biological Soil Crusts: Ecology and Management. Technical Reference 1730-2. United States Department of the Interior, Bureau of Land Management and U.S. Geological Survey.

Benton, Robert. 1987. The Yellow-Billed Cuckoo. Utah Birds, Volume 3, Number 1, March 1987,pp. 7-11.

Bird, D.M., D.E. Varland and J.J. Negro. 1996. Raptors in human landscapes: adaptations to built and cultivated environments. Academic Press, London, United Kingdom.

Blackett, R., 1996. Tar Sand Resources of the Uinta Basin, Utah: A Catalog of Deposits. Utah Geological Survey Open File Report 335.

Bloyer, Jerusha Marie. 2002. Support for Tourism Development in Gateway Communities to the Grand Staircase-Escalante National Monument. Department of Parks, Recreation, and Tourism, University of Utah, 154 pp.

Braun, C. E. 1986. Changes in sage grouse lek counts with advent of surface coal mining. Proceedings, issues and technology in the management of impacted western wildlife. Thorne Ecological Institute 2:227–231.

Braun, C. E., O. O. Oedekoven, and C. L. Aldridge. 2002. Oil and gas development in western North America: effects on sagebrush steppe avifauna with particular emphasis on sage grouse. Transactions North American Wildlife and Natural Resources Conference 67:337-349.

Brooks, Matthew L. 1999. Alien annual grasses and fire in the Mojave Desert. Madrono. 46(1): 13-19

Brown, Bryan T. 1993. Winter Foraging Ecology of Bald Eagles in Arizona. *The Condor* Vol. 95, No. 1 (Feb., 1993), pp. 132-138 Published by: University of California Press Article Stable URL:http://www.jstor.org/stable/1369394.

Bryant, B. 1992. Geologic and Structure Maps of the Salt Lake City 1º x 2 º Quadrangle, Utah and Wyoming: United States Department of the Interior, United States Geological Survey.

Bureau of Land Management (BLM). 1984. Final Environmental Impact Statement on the Book Cliffs Resource Management Plan, BLM Vernal Field Office, Vernal, Utah.

_____. 1986. Visual Resource Contrast Rating. BLM Manual H-8431-1. Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management.

_____. 1997. Rangeland Health: Standards and Guidelines for Healthy Rangelands. United States Department of the Interior, Bureau of Land Management, Utah State Office. Accessed May 20, 2012 at http://www.blm.gov/ut/st/en/grog/grazing/utah_standards-for.html.

_____. 2002a. Mineral Potential Report for the Vernal Planning Area. United States Department of the Interior, Bureau of Land Management. Dated October 2002.

_____. 2002b. Instruction Memorandum Environmental Justice No. 2002-164. USDOI, BLM Washington, D.C. May 2002.

_____. 2003a. Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restriction or Impediments to Their Development: The Paradox/San Juan, Uinta/Piceance, Great Green River, and Powder River Basins and the Montana Thrust Belt. United States Department of the Interior, Bureau of Land Management. January 2003.

_____. 2003b. The BLM's Priorities for Recreation Visitor Services. BLM Workplan Fiscal Years 2003-2007. United States Department of the Interior, Bureau of Land Management. Dated May 2003.

_____. 2004b. National Sage-Grouse Habitat Conservation Strategy. 1.4.1. Guidance for the Management of Sagebrush Plant Communities for Sage-Grouse Conservation. U.S. Department of the Interior. Access online at http://www.blm.gov/wo/st/en/prog/more/fish__wildlife_and/wildlife/national_sage-grouse.html.

_____. 2005a. Final Environmental Impact Statement and Record of Decision, Castle Peak and Eightmile Flat Oil and Gas Expansion Project, UT-080-2002-168. United States Department of the Interior, Bureau of Land Management, Vernal Field Office. Vernal, Utah.

_____. 2005b. Draft Resource Management Plan and Environmental Impact Statement. BLM Vernal Field Office, Vernal, Utah. January 2005.

_____. 2005c. Land Use Planning Handbook, H-1601-1. United States Department of the Interior Bureau of Land Management. Access at http://www.blm.gov/pgdata/etc/medialib/blm/ak/aktest/planning/planning_general.Par.65225.File.dat/blm_lup_handbook.pdf.

_____. 2006a. Gasco Production Company's Proposed Natural Gas Well Drilling Project: Riverbend Unit Environmental Assessment. BLM Vernal Field Office, Vernal Utah. UT080-2005-0322. January 2006.

_____. 2006d. Resource Development Group Uinta Basin Natural Gas Project Final Environmental Impact Statement. UT-080-2003-0300V. Vernal, Utah: U.S. Department of the Interior, Bureau of Land Management, Vernal Field Office.

_____. 2007a. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (The Gold Book). United States Department of the Interior, Bureau of Land Management and the United States Department of Agriculture, Forest Service. Access online at http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html.

_____. 2007b. Instruction Memorandum 2008-009. Potential Fossil Yield Classification System for Paleontological Resources on Public Lands. United States Department of the Interior, Bureau of Land Management. Washington, D.C. Dated October 15, 2007.

_____. 2007c. EOG Resources Inc. Chapita Wells-Stagecoach Area Natural Gas Development Final Environmental Impact Statement and Biological Assessment. UTU-080-2005-0010, FES 07-50. Bureau of Land Management, Vernal Field Office, Vernal, Utah. May 2007.

_____. 2008a. National Environmental Policy Act Handbook, BLM Handbook H-1790-1. Department of the Interior, Bureau of Land Management. Washington, D.C., January 2008.

_____. 2008b. Record of Decision and Approved Resource Management Plan. Vernal Field Office. Vernal, Utah.

_____. 2008c. Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restriction or Impediments to Their Development: Phase II Inventory – Onshore United States. United States Department of the Interior, Bureau of Land Management.

_____. 2008d. Fact Sheet – Wild and Scenic Rivers. BLM Grand Junction Field Office, Grand Junction, Colorado. December 2008.

_____. 2010a. Greater Natural Buttes Draft Environmental Impact Statement. DES 10-31. Vernal, Utah: United States Department of the Interior, Bureau of Land Management, Vernal Field Office. Available online at http://www.blm.gov/ut/st/en/fo/vernal/planning/nepa_/greater_natural_buttes.html.

_____. 2010b. Bureau of Land Management Utah NEPA Guidebook. United States Department of the Interior, Bureau of Land Management. Access online at http://www.blm.gov/pgdata/etc/medialib/blm/ut/natural_resources/planning.Par.95843.File.dat/Utah%20NEPA%20Guidebook%20July%202010.pdf.

_____. 2010c. West Tavaputs Plateau Natural Gas Full Field Development Plan Final Environmental Impact Statement. UT-070-05-055, FES 09-02. Price, Utah: United States Department of the Interior, Bureau of Land Management, Price Field Office. Available online at http://www.blm.gov/ut/st/en/fo/price/energy/Oil_Gas/wtp_final_eis.html. July 2010.

_____. 2011a. Green River District Reclamation Guidelines for Reclamation Plans. United States Department of the Interior Bureau of Land Management. Access online at http://www.blm.gov/pgdata/etc/medialib/blm/ut/price_fo/oil_and_gas_2.Par.5635.File.dat/Attachment%203%20-%20WTP%20Record%20of%20Decision[1].pdf. Revised March 2011.

_____. 2011b. Greater Sage-Grouse Interim Management Policies and Procedures, Instruction Memorandum No. 2012-043. United States Department of the Interior, Bureau of Land Management Washington, D.C. 20240.

_____. 2011c. BLM National Greater-Sage Grouse Land Use Planning Strategy, Instruction Memorandum No. 2012-044. United States Department of the Interior, Bureau of Land Management, Washington, D.C. 20240.

_____. 2011d. Supplement to the Greater Natural Buttes Draft Environmental Impact Statement. DES 10-31. Vernal, Utah: U.S. Department of the Interior, Bureau of Land Management, Vernal Field Office.

_____. 2011e. Bureau of Land Management – Utah, Air Resource Management Strategy (ARMS). July 2011.

_____. 2012a. Greater Natural Buttes Final Environmental Impact Statement. United States Department of the Interior, Bureau of Land Management Access online at http://www.blm.gov/ut/st/en/fo/vernal/planning/nepa_.html.

_____. 2012b. Gasco Energy Inc. Uinta Basin Natural Gas Development Project, Final Environmental Impact Statement.. UT-080-06-253 FES 12-5. United States Department of the Interior, Bureau of Land Management, Vernal Field Office. Vernal, Utah. Dated March 2012.

_____. 2012c. Greater Uinta Basin Oil and Gas Cumulative Impacts Technical Support Document. United States Department of the Interior, Bureau of Land Management, Vernal Field Office. Dated March 2012.

_____. 2012d. Areas of Critical Environmental Concern. United States Department of the Interior, Bureau of Land Management, Utah State Office. Accessed September 14, 2012 at http://www.blm.gov/ut/st/en/prog/more/acecs.html.

_____. 2012e. Pariette Wetlands. Accessed September 14, 2012 at http://www.blm.gov/ut/st/en/fo/ Vernal/recreation_/pariette_wetlands.html.

_____. 2012f. Greater Natural Buttes Record of Decision, UT-080-07-807, Appendix D – Final Biological Opinion. Vernal Field Office, Utah. May 2012.

_____. 2013. Approved Land Use Plan Amendments/Record of Decision for Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the Bureau of Land Management in Colorado, Utah and Wyoming and Final Programmatic Environmental Impact Statement BLM-WO-GI-13-003-1793. March 2013.

_____. 2014a. Price Field Office Web Site. BLM Price Field Office. Available at: http://www.blm.gov/ut/st/en/fo/price/recreation/riverinf/outfitters.html. Accessed April 2, 2014.

_____. 2014b. Utah Air Resource Management Strategy Modeling Project Impact Assessment Report. Prepared by AECOM and Sonoma Technologies, Inc. September 30, 2014.

Call, M.W. and C. Maser. 1985. Wildlife habitats in managed rangeland—the Great Basin of southeastern Oregon—Sage Grouse. U.S. Forest Service Technical Report PNW-187. 30 pp.

Cashion, W. 1973. Geologic and Structure Map of the Grand Junction Quadrangle, Colorado and Utah, USGS Miscellaneous Geologic Investigations Map I-736, Scale 1: 250,000.

Carbon Dioxide Information Analysis Center (CDIAC). 2013. Carbon Dioxide Information Analysis Center, U.S. Department of Energy, *Global Carbon Budget 2012*, December 3, 2012. Available at: http://www.globalcarbonproject.org/carbonbudget/. Accessed January 2013.

Clark, J. 1957. Geomorphology of the Uinta Basin, *in* Guidebook to the Geology of the Uinta Basin, Intermountain Association of Petroleum Geologists, Eighth Annual Field Conference, pp. 17-20.

Collins, C.P. and T.D. Reynolds. 2005, September 2. Ferruginous Hawk (*Buteo regalis*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/ferruginoushawk.pdf.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines to Manage Sage Grouse Populations and Their Habitats. Wildlife Society Bulletin 28(4):967-985.

Council on Environmental Quality (CEQ). 1997. Environmental Justice, Guidance under the National Environmental Policy Act. Council on Environmental Quality, Executive Office of the President. Access online at http://ceq.hss.doe.gov/nepa/regs/ej/ej.pdf.

Crawford, J.A., R.A. Olson, N.E. West, J.C. Mosley, M.A. Schroeder, T.D. Whitson, R.F. Miller, M.A. Gregg, and C.S. Boyd. 2004. Ecology and management of sage-grouse and sage-grouse habitat. Journal of Rangeland Management 57(1):2–19.

Crompton, B., and D. L. Mitchell. 2005. The sage-grouse of Emma Park – Survival, production, and habitat use in relation to coalbed methane development. Utah Division of Wildlife Resources Report, Salt Lake City, Utah.

Deseret News. 2012. "Uintah Basin sees 'tremendous' job growth." Geoff Liesik, March 7, 2012. Available online at http://www.deseretnews.com/article/865551768/Uinta-Basin-sees-tremendous-job-growth.html?pg=all.

Dinosaurland Travel Board. 2012. Accessed April 2012 at http://www.dinoland.com/.

Doherty, K. E., D. E. Naugle, B. L. Walker, and J. M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. Journal of Wildlife Management 72:187-195.

Duchesne County. 1997, as amended. *Duchesne County General Plan*. Amended Winter 1998, Winter 2005, June 25, 2007, April 16, 2012, and August 19, 2013.

Duchesne County Emergency Management Department. 2012. Accessed April 2012 at http://duchesne.utah.gov/government/emergency-management.html.

Duchesne County School District. 2012. Accessed April 2012 at http://www.dcsd.org/.

Duchesne County Sheriff's Department. 2012. Accessed April 2012 at http://duchesne.utah.gov/government/public-safety/sheriffs-office.html.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. New York: Simon and Schuster, Inc.

Elliot, W.J.; Scheele, D.L.; Hall, D.E. 2000. The Forest Service WEPP interfaces. Presented at the 2000 ASAE annual international meeting, Milwaukee, WI, July 9-12, 2000. Paper No. 00-5021. St. Joseph, MI: ASAE. 9 pp.

Elliott, A. and K. Harty. 2010a. Landslide Maps of Utah Duchesne 30' x 60' Quadrangle. Utah Geological Survey Map 246DM Plate 15 of 46. Division of Utah Department of Natural Resources.

_____. 2010b. Landslide Maps of Utah Vernal 30' x 60' Quadrangle. Utah Geological Survey Map 246DM Plate 16 of 46. Division of Utah Department of Natural Resources.

Endrulat, EG., McWilliams, S.R. & Tefft, B.C. 2005:Habitat selection and home range size of ruffed grouse in Rhode Island. Northeastern Naturalist 12: 411-424.

Farmer, A.M. 1993. The effects of dust on vegetation – a review. Environmental Pollution. 79(1): 63-75.

Federal Geographic Data Committee (FGDC). 1997. Federal Geographic Data Committee - Vegetation Subcommittee National Vegetation Classification Standard. Reston, Virginia.

Felzburg Holt and Ullevig, and BBC Research and Consulting. 2012. Douglas County Oil and Gas Production Transportation Impact Study. Prepared for Douglas County, Colorado. January 2012.

Ferguson, Tammy. Uintah County Road Department. 2007. Personal communication with Elisha Wardle, SWCA Environmental Consultants. July 2007. Cited in BLM 2012b.

Fertig, W., R. Black, and P. Wolken. 2005. Rangewide Status Review of Ute Ladies'-tresses (*Spiranthes diluvialis*). Prepared for the U.S. Fish and Wildlife Service and Central Utah Water Conservancy District. 101 pp. September 30, 2005.

Fitzgerald, J. P., C. A. Meaney, and D. M. Armstrong. 1994. Mammals of Colorado. University Press of Colorado Publishing, Niwot, Colorado.

Fowler, J.M. and Witte, J. 1985. Oil and Gas Activity on Ranch Operations and Range lands. Rangelands, 7(1): 35-37.

Giraud, R. and L. Shaw. 2007. Landslide Susceptibility Map of Utah. Utah Geological Survey Map 228DM Plate 1. Division of Utah Department of Natural Resources.

Hayward, C. L., Cottam, C., Woodbury, A. M., and Frost, H. H. 1976. Birds of Utah. Great Basin Naturalist Memoirs 1: 1-229.

Heil, K. D. and J. M. Porter. 1994. Sclerocactus (Cactaceae): A revision. Haseltonia Yearbook of the Cactus and Succulent Society of America, Number 2.

_____. 2004. Sclerocactus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 12+ vols. New York and Oxford. Volume 4, pp. 98-99, 199-201.

Hingtgen. T.M. and W.R. Clark. 1984. Impact of Small Mammals on the Vegetation of Reclaimed Land in the Northern Great Plains. Journal of Range Management 37(5): 438-441.

Hochstätter, F. 1989. Nieubeschrijving *Sclerocactus wetlandicus* species nova-Een nieuwe Sclerocactus uit Uintah County, Utah, USA (English reprint in Hochstätter1993). Succulenta (Netherlands) 68: 123-124. Cited in BLM 2012b.

_____. 1993a. The Genus Sclerocactus (Revised). Published by the author, Manheim, Germany. 128 pp. Cited in BLM 2012b.

_____. 1993b. Sclerocactus een revisie 3 (English reprint in Hochstätter 1993). Succulenta (Netherlands) 72: 82-92. Cited in BLM 2012b.

Holmes, W. F., and B. A. Kimball. 1987. Ground Water in the Southeastern Uinta Basin, Utah and Colorado. U.S. Geological Survey Water-Supply Paper 2248. U.S. Geological Survey. Denver, Colorado.

Holloran, M. J. 2005. Greater sage-grouse (*Centrocercus urophasianus*) population response to natural gas field development in western Wyoming. PhD Dissertation. University of Wyoming. Laramie, Wyoming. 211 pp.

Hwang S.T., Brown D.F., O'Steen J.K., Policastro, A.J., and Dunn, W.E. 2001. Risk Assessment for National Transportation of Selected Hazardous Materials. Transportation Research Record: Journal of the Transportation Research Board, Transportation Research Board of the National Academies, Volume 1763 / 2001, pp. 114-124.

Iorns, William Vaughn; Hembree, Charles Herbert; Oakland, Godfrey L. 1965. USGS Professional Paper: 441. Water resources of the Upper Colorado River Basin – Technical Report. Available online at http://pubs.er.usgs.gov/publication/pp441.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Impacts, Adaptation and Vulnerability. 32 Avenue of the Americas, New York, NY 10013-2473, USA.

Intermountain West Joint Venture. 2005. Coordinated Bird Conservation Plan Version 1.1. Access online at http://iwjv.org/sites/default/files/iwjv_2005_implementaion_plan.pdf.

Johnsgard, P. A. 1981. The plovers, sandpipers and snipes of the world. University of Nebraska Press, Lincoln, U.S.A. and London.

_____. 1990. Hawks, Eagles, and Falcons of North America. Smithsonian Institution Press, Washington, D.C. 145 pp.

_____. 2002. North American Owls: Biology and Natural History, Second Edition. Smithsonian Institution Press, Washington, D.C. 215 pp.

Johnson, Bill. Uintah County, Vernal City Economic Development. 2006. Personal communication with Elisha Wardle, SWCA Environmental Consultants. October 2006. Cited in BLM 2012b.

Kaufman, K. 1996. Lives of North American Birds. Boston: Houghton Mifflin.

Kenny, Terry A. Gerner, Steven J.; Buto, Susan G.; Spangler, Lawrence E. 2009. USGS Scientific Investigation Reports 2009-5007. Spatially Referenced Statistical Assessment of Dissolved-Solids Load Sources and Transport in Streams of the Upper Colorado River Basin. Available online at http://pubs.usgs.gov/sir/2009/5007/.

Keighin, C. and M. Hibpshman. 1975. Preliminary Mineral Resource Study of the Uintah and Ouray Reservation, Utah. United States Geological Survey and United States Bureau of Mines Administrative Report BIA-4.

Kingery, H.E. (ed.). 1998. Colorado Breeding Bird Atlas. Colorado Bird Atlas Partnership, Durango, and Colorado Division of Wildlife, Denver, Colorado.

Kleinfelder, Inc. 2015. Email Communication with Brian Maxfield (Utah Division of Wildlife Resources). Received April 23, 2015.

Liebermann, T. D.; Mueller, D. K.; Kircher, J. E.; Choquette, A.F. 1989. Characteristics and trends of streamflow and dissolved solids in the upper Colorado River Basin, Arizona, Colorado, New Mexico, Utah, and Wyoming. USGS Numbered Series. U.S. G.P.P, Books and Open – File Report Section. Available online at http://pubs.er.usgs.gov/publication/wsp2358.

Logan Simpson Design Inc. Visual Resource Inventory - Bureau of Land Management Vernal Field Office. November 2011. 251 pp.

Lowry, J.H., Jr., R.D. Ramsey, K.A. Thomas, D. Schrupp, W. Kepner, T. Sajwaj, J. Kirby, E. Waller, S. Schrader, S. Falzarano, L. Langs, G. Manis, C. Wallace, K. Schulz, P. Comer, K. Pohs, W. Rieth, C. Velasquez, B. Wolk, K. Boykin, L. O'Brien, J. Prior-Magee, D. Bradford and B. Thompson. 2007. Land Cover Classification and Mapping. Chapter 2 *in* J.S. Prior-Magee, ed. Southwest Regional Gap Analysis Final Report. U.S. Geological Survey, Gap Analysis Program, Moscow, Idaho. Available at http://fws-nmcfwru.nmsu.edu/swregap/.

Lyon, A. G., and S. H. Anderson. 2003. Potential gas development impacts on sage grouse nest initiation and movement. Wildlife Society Bulletin 31:486-491.

Manning, A.E. E., and C.M. White. 2001. Breeding biology of mountain plovers (*Charadrius montanus*) in the Uinta Basin. Western North American Naturalist 61(2):223–228.

Mathisen, J. E. 1968. Effects of human disturbance on nesting bald eagles. Journal of Wildlife Management. 321-6.

McGinty, E. L., B. Baldwin and R. Banner. 2009. A Review of Livestock Grazing and Range Management in Utah. Sponsored by the State of Utah Governor's Public Lands Policy Coordination Office. Under a contract entitled "Setting the Stage for a Livestock Grazing Policy in Utah." Utah State University, Logan, UT. Dated February 2009. 45 pp.

Montgomery Archaeological Consultants, Inc. (MOAC). 2011. Class I Existing Data Review for Newfield Exploration and Production's Greater Monument Butte Project Area, Duchesne and Uintah Counties, Utah. September 5, 2011.

Muscha, J.M. and A. L. Hild. 2006. Biological Soil Crusts in Grazed and Ungrazed Wyoming Sagebrush Steppe. Journal of Arid Environments 67: 195-207.

Naftz D.L.; Bullen T.D.; Stolp B.J.; Wilkowske C. D. 2008. Utilizing geochemical, hydrologic, and boron isotopic data to assess the success of a salinity and selenium remediation project, Upper Colorado River Basin, Utah. Science of The Total Environment, Volume 392, Issue 1, 15 March 2008, Pages 1–11.
Access at http://www.sciencedirect.com/science/article/pii/S0048969707011102.

National Park Service (NPS). 1995. National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation. Revised. United States Department of the Interior, National Park Service Interagency Resources Division, National Register Branch. Washington, D.C.

_____. 2009: Rocky Mountain Atmospheric Nitrogen and Sulfur Study (RoMANS), Volumes I and II, October 2009, ISSN 0737-5352-84. Available at www.nature.nps.gov/air/studies/romans.cfm.

_____. 2010. Federal Land Managers' Air Quality Related Values Work Group (FLAG), Phase I Report – Revised (2010). Natural Resource Report NPS/NRPC/NRR-2010/232. October 2010.

_____. 2012: Ozone Standard Exceedances in National Parks, Data Summaries for 2010, 2011, and 2012. Available at www.nature.nps.gov/air/monitoring/exceed.cfm.

Natural Resources Conservation Service (NRCS). 1998. Soil Quality Resource Concerns: Available Water Capacity. United States Department of Agriculture, Natural Resources Conservation Service. Available online at http://soils.usda.gov/sqi/publications/files/avwater.pdf.

_____. 2003. Soil Survey of Uintah Area, Utah – Parts of Daggett, Grand, and Uintah Counties. United States Department of Agriculture, Natural Resources Conservation Service. Available online at http://soildatamart.nrcs.usda. gov/Manuscripts/UT047/0/UT047.pdf.

_____. 2011. Uintah Area, Utah – Parts of Uintah, Grand, and Daggett Counties, Table Y – Prime Farmland. United States Department of Agriculture, Natural Resources Conservation Service, Utah State Office. April. Available online at: http://www.ut.nrcs.usda.gov.

_____. 2012a. Draft soil survey data for Duchesne County, Utah. Received via electronic mail from NRCS Utah State Office on July 9, 2012.

_____. 2012b. Official Soil Series Descriptions. United States Department of Agriculture, Natural Resources Conservation Service. Accessed June 21, 2012 at http://soils.usda.gov/technical/classification/osd/index.html.

_____. 2012c. Web Soil Survey. United States Department of Agriculture, Natural Resources Conservation Service. Accessed June 21, 2012 at http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

_____. 2013. Duchesne Area, Utah – Parts of Duchesne, Utah, and Wasatch Counties, 2013_9 Draft – Prime and Other Important Farmlands. United States Department of Agriculture, Natural Resources Conservation Service, Utah State Office. Text file from Mike Domeier. September.

NatureServe. 2007. Encyclopedia of life. Available online at http://www.natureserve.org/explorer.

Nolan, James J. III. 2004. "Establishing the statistical relationship between population size and UCR crime rate: Its impact and implications." Journal of Criminal Justice, vol. 32, issue 6 (November-December 2004): 547-555.

Newfield Exploration Company. 2012. Uinta Basin / Greater Monument Butte Area. Available online at http://www.newfld.com/assets/pdf/uintaupdate.pdf.

Oliver, G.V. 2000. The Bats of Utah, A Literature Review. Publication Number 00–14. Prepared for Utah Reclamation Mitigation and Conservation Commission and the U. S. Department of the Interior. Department of Natural Resources, Division of Wildlife Resources—Utah Natural Heritage Program.

Oliver, G. V., A. J. Kozlowski, K. S. Day, and K. D. Bunnell. 2009. Proposed Utah Bat Conservation Plan. Utah Division of Wildlife Resources.

Pampush, G. J. 1980. Breeding chronology, habitat utilization, and nest-site selection of the Long-billed Curlew in northcentral Oregon. Unpublished thesis, Oregon State University, Corvallis. 49 pp.

Parrish, J. R., F. P. Howe, and R. E. Norvell. 2002. Utah Partners in Flight Avian Conservation Strategy Version 2.0. Utah Division of Wildlife Resources Publication Number 02-27. Salt Lake City, Utah.

Parson, W. 1994. Relationships between human activities and nesting Bald Eagles in western Washington. Northwestern Naturalist 75:44-53.

Patterson, R.L. 1952. The Sage Grouse in Wyoming. Denver: Sage Books, Inc.

Porter, J. M., M. S. Kinney, and K. D. Heil. 2000. Relationships between Sclerocactus and Toumeya (Cactaceae) based on chloroplast TRNL-TRNF Sequences. Haseltonia: Yearbook of the Cactus and Succulent Society of America 7: 8-23.

Porter, J. M., J. Cruse-Sanders, and R. Lauri. 2006. A preliminary assessment of genetic relationships among *Sclerocactus brevispinus* Heil & Porter, *S. wetlandicus* Hochstatter, and *S. glaucus* (K Schum.) L. Benson. 15 pp.

Pruitt, R. 1961. The Mineral Resources of Uintah County. Utah Geological and Mineralogical Survey Bulletin 71.

Rasmussen, D. T., Conroy, G. C., Friscia, A. R., Townsend, K. E., and Kinkel, M. D. 1999. Mammals of the middle Eocene Uinta Formation. Vertebrate Paleontology in Utah: Utah Geological Survey Miscellaneous Publication 99(1): 401-420.

Realtor.com. 2012. Accessed April 2012 at http://www.realtor.com/?source=web.

Reeve, A.F. 1984. Environmental influences on male pronghorn home range and pronghorn behavior. Ph.D. Dissertation, Univ. of Wyoming, Laramie. 172 pp.

Remington, T. E., And C. E. Braun. 1991. How surface coal mining affects sage grouse, North Park, Colorado. Proceedings, Issues and Technology in the Management of Impacted Western Wildlife. Thorne Ecological Institute 5: 128–132.

Renfrew, R.B., C.A. Ribic, J.L. Knack. 2005. Edge avoidance by nesting grassland birds: a futile strategy in a fragmented landscape. The Auk 122(2): 618-636.

Ritzma, H. 1979. Oil-impregnated Rock Deposits of Utah: Utah Geological and Mineral Survey Map 47, Scale 1:1,000,000.

Romin, L.A., J.A. Muck. 2002. Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. United states Fish and Wildlife Service, Salt Lake City, Utah. Access online at http://www.fws.gov/utahfieldoffice/Documents/MigBirds/Raptor%20Guidelines%20(v%20March%2020,%202002).pdf.

Rowley, P.D., W.R. Hanse, O. Tweto, and P.E. Carrara. 1985. Geologic Map of the Vernal 1º x2º Quadrangle, Colorado, Utah, and Wyoming. Miscellaneous Investigations Map I-1526. Scale 1:250K. Reston, Virginia: U.S. Geological Survey.

Ryser, Jr., Fred A. 1985. Birds of the Great Basin. University of Nevada Press, Reno.

Segerstrom, T. B. 1982. Effects of an operational coal mine on pronghorn antelope. M.S. thesis, Montana State University, Bozeman. 68 pp.

Seglund, A.E., A.E. Ernst, M. Grenier, B. Luce, A. Puchniak and P. Schurr. 2004. White-tailed Prairie Dog Conservation Assessment.

Sigler, W.F., and J.W. Sigler. 1996. Fishes of Utah: A Natural History. Salt Lake City: University of Utah Press.

Smith, M.D., R.S. Krannich, L.M. Hunter. 2001. Growth, Decline, Stability, and Disruption: A Longitudinal Analysis of Social Well-Being in Four Western Rural Communities. Rural Sociology 66(3): 425-450.

Sprinkel, D. 2007. Interim Geologic Map of the Vernal 30' x 60' Quadrangle, Uintah and Duchesne Counties, Utah, and Moffat and Rio Blanco Counties, Colorado. Utah Geological Survey, Division of Utah Department of Natural Resources.

Steidl, R. J., and R. G. Anthony. 1996. Responses of bald eagles to human activity during the summer in interior Alaska. *Ecological Applications* 6(2):482-491.

Steidl, R.J. and R.G. Anthony. 2000. Experimental Effects of Human Activity on Breeding Eagles. Ecological Applications. 10(1): 258-268.

Stokes, W.L. 1986. Geology of Utah. Salt Lake City, University of Utah.

Swift, L.W. Jr. 1984. Gravel and grass surfacing reduces soil loss from mountain roads. *Forest Science* 30 (3): 657-670.

Tepedino, V.J., T.L. Griswold, and W.R. Bowlin. 2010. Reproductive biology, hybridization, and flower visitors of rare Sclerocactus taxa in Utah's Uinta Basin. Western North American Naturalist70(3):377–386.

Thompson, J.R., Mueller, P.W., Flückiger, W., and Rutter, A.J. 1984. The Effect of Dust on Photosynthesis and Its Significance for Roadside Plants. Environmental Pollution Series A, Ecological and Biological, Volume 34, Issue 2, 1984, Pages 171–190.

Torrell, L.A., L.P. Owen, K.C. McDaniel, and D. Graham. 2000. Perceptions and economic losses from locoweed in northeastern New Mexico. J. Range Manage. 53:376–383.

Uintah Basin Medical Center. 2012. Accessed April 2012 at http://www.ubmc.org/getpage.php?name=index.

Uintah County. 2005, as amended. *Uintah County General Plan 2005*. Last amended February 27, 2012.

Uintah County Emergency Management Department. 2012. Accessed April 2012 at http://www.co.uintah.ut.us/em/em.php.

Uintah County School District. 2012. Accessed April 2012 at http://www.uintah.net/.

U.S. Census Bureau. 2010. 2010 U.S. Census. Available online at http://factfinder2.census.gov/ faces/nav/jsf/pages/index.xhtml.

_____. 2011. Selected Economic Characteristics, 2007-2011 American Community Survey 5-Year Estimates. Available online at http://factfinder2.census.gov/ faces/ nav/ jsf/ pages /index.xhtml.

U.S. Department of Agriculture. 2005. RUSLE2 User Guide. Available online at http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_021590.pdf. December 2005.

U.S. Department of Agriculture, Forest Service. 2012. Water Erosion Prediction Project Forest Road Erosion Predictor (WEPP:Road), Version 2012.10.30, (online computer program http://forest.moscowfsl.wsu.edu/fswepp/).

U.S. Department of the Interior, Natural Resource Conservation Service. 2003. Soil Survey of Uintah Area, Utah—Parts of Daggett, Grand, and Uintah Counties. U.S. Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Utah Agriculture Experiment Station, United States Department of Interior, BLM, Bureau of Indian Affairs, U.S. Fish and Wildlife Service, Uintah Soil Conservation District, and the Daggett Soil Conservation District.

United States Environmental Protection Agency (USEPA).1994. Executive Order Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The White House Access online at http://epa.gov/environmentaljustice/resources/policy/exec_order_12898.pdf.

_____. 1993. Superfund National Oil and Hazardous Substances Pollution Contingency Plan (see 40 CFR § 300.430 (e) (2) (i) (A) (2))

_____. 1998b. Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses. April 1998. Available online at http://www.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_epa0498.pdf.

_____. 1998b. Report on the Peer Consultation Workshop on Selenium Aquatic Toxicity and Bioaccumulation. Office of Water. September

_____. 2002. The Biological Effects of Suspended and Bedded Sediment (SABS) in Aquatic Systems: A Review.Office of Research and Development, National Health and Environmental Effects Laboratory. August 20, 2003.

_____. 2006. Installing Plunger Lift Systems in Gas Wells. Lessons Learned from Natural gas STAR Partners. U.S. Environmental Protection Agency Air and Radiation (6202J), 1200 Pennsylvania Avenue., N.W. Washington, D.C. 20460. Available online at: www.epa.gov/gasstar/documents/ll_plungerlift.pdf

_____. 2012b. Inventory of U.S. Greenhouse Gas Emissions and Sinks:1990 – 2010, EPA 430-R-12-001. U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue., N.W. Washington, D.C. 20460. Available online at: http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2012-Main-Text.pdf.

_____. 2013. Inventory of U.S. Greenhouse Gas Emissions and Sinks:1990 – 2011, EPA 430-R-13-001. U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue., N.W. Washington, D.C. 20460. Available online at: http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-Main-Text.pdf.

_____. 2014. United States Environmental Protection Agency Air Quality System (AQS) Data Mart Monitor Values. Available at http://www.epa.gov/airquality/airdata/ad_rep_mon.html.

United States Fish and Wildlife Service (USFWS). 1979. Endangered and Threatened Wildlife and Plants; Determination That *Sclerocactus glaucus* is a Threatened Species. 50 CFR Part 17. Federal Register Vol. 44, No. 198: 58868-58870.

_____. 1987. Final Environmental Assessment for the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin. United States department of the Interior, Fish and Wildlife Service, Region 6. Available online at http://www.coloradoriverrecovery.org/documents-publications/foundational-documents/1987EA.pdf.

_____. 1990. Uinta Basin hookless cactus (*Sclerocactus glaucus*) recovery plan. U.S. Fish and Wildlife Service, Region 6, Denver, Colorado.

_____. 1993. Section 7 Consultation, Sufficient Progress, and Historic Projects Agreement and Recovery Action Plan. United States Department of the Interior, Fish and Wildlife Service. Available at: http://www.coloradoriverrecovery.org/documents-publications/foundational-documents/RIPRAP/RIPRAPapril4-03.pdf.

_____. 1994. Endangered and threatened wildlife and plants. Determination of critical habitat for the Colorado River endangered fishes: razorback sucker, Colorado squawfish, humpback chub, and bonytail chub. Federal Register 59:13374–13400.

_____. 1995a. Ute ladies'-tresses (*Spiranthes diluvialis*) agency review draft recovery plan. U.S. Fish and Wildlife Service, Region 6, Denver, CO.

_____. 1995b. Intra-Service Section 7 Consultation for Elimination of Fees for Water Depletions of 1000 acre-feet or Less from the Upper Colorado River Basin. March 9, 1995.

_____. 2000. Ouray National Wildlife Refuge Comprehensive Conservation Plan. Prepared by UFWS, Ouray National Wildlife Refuge, Randlett, Utah. July 2000.

_____. 2001. Genetics Study for Western Yellow-billed Cuckoo Now Available. Document Number 01-76. Released June 7, 2001. United States Department of the Interior, Fish and Wildlife Service. Available Online at http://www.fws.gov/pacific/news/2001/2001-76.htm.

_____. 2002a. Birds of Conservation Concern 2002. U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. Access online at http://www.doeal.gov/SWEIS/OtherDocuments/457%20usfws2002%20birds%20of%20conservation%20concern.pdf.

_____. 2002b. Colorado Pikeminnow (*Ptychocheilus lucius*) Recovery Goals: Amendment and Supplement to the Colorado Squawfish Recovery Plan. Prepared for U.S. Fish and Wildlife Service, Region 6, Denver, Colorado.

_____. 2002c. Bonytail (*Gila elegans*) Recovery Goals: Amendment and Supplement to the Bonytail Chub Recovery Plan. Prepared for U.S. Fish and Wildlife Service, Region 6, Denver, Colorado.

_____. 2002d. *Razorback Sucker (*Xyrauchen texanus*) Recovery Goals: Amendment and Supplement to the Razorback Sucker Recovery Plan*. Prepared for U.S. Fish and Wildlife Service, Region 6, Denver, Colorado.

_____. 2002e. Humpback Chub (*Gila cypha*) Recovery Goals: Amendment and Supplement to the Humpback Chub Recovery Plan. Prepared for U.S. Fish and Wildlife Service, Region 6, Denver, Colorado.

_____. 2007a. Critical Habitat Portal. Available online at http://criticalhabitat.fws.gov/crithab/.

_____. 2007b. 12-Month Finding on a Petition to List *Sclerocactus Brevispinus* (Pariette Cactus) as Endangered or Threatened; Taxonomic Change from *Sclerocactus glaucus* to *Sclerocactus brevispinus*, *S. glaucus*, and *S. wetlandicus*. Federal Register, 72: 53211-53222. September 18, 2007.

_____. 2007c. Endangered and Threatened Wildlife and Plants; Removing the Bald Eagle in the Lower 48 States From the List of Endangered and Threatened Wildlife. 50 CFR Part 17. Federal Register 72: 37346-37371.

_____. 2007d. National Bald Eagle Management Guidelines. United States Fish and Wildlife Service, Washington, D.C.

_____. 2008. Birds of Conservation Concern 2008. Arlington, Virginia: U.S. Fish and Wildlife Service.

_____. 2009a. Review of native species that are candidates for listing as endangered or threatened: Annual description of progress on listing actions. Federal Register, 74: 57803-57878. November 9, 2009.

_____. 2009b. Taxonomic change of *Sclerocactus glaucus* to three separate species. Federal Register, 74: 47112-47117. September 15, 2009.

_____. 2010a. Recovery outline for the *Sclerocactus wetlandicus* (Uinta Basin hookless cactus). Utah Ecological Services Field Office. April 14, 2010.

_____. 2010b. Recovery outline for the *Sclerocactus brevispinus* (Pariette cactus). Utah Ecological Services Field Office. April 14, 2010.

_____. 2010c. Fact Sheet - Endangered Species Act Listing Decision for the Greater Sage-Grouse. March 5, 2010.

_____. 2011. News Release: Fish and Wildlife Service Determines the Mountain Plover Does Not Warrant Protection Under the Endangered Species Act. May 11, 2011. Accessed July 20, 2011 at http://www.fws.gov/mountain-prairie/species/birds/mountainplover/PressRelease05112011.pdf.

_____. 2012a. National Wetlands Inventory. Accessed September 2012 at http://www.fws.gov/wetlands/data/mapper.html.

_____. 2012b. Latest Species Assessment for Pariette cactus (*S. brevispinus*) dated November 20, 2012. Accessed September 10, 2013 at http://www.fws.gov/ecos/ajax/speciesProfile/profile/speciesProfile.action?spcode=Q3KI.

_____. 2013. USFWS *Sclerocactus* polygon. March.

_____. 2014. U.S. Fish and Wildlife Service Species Assessment And Listing Priority Assignment Form: *Sclerocactus brevispinus.* Information current as of April 10, 2014. Available at https://ecos.fws.gov/docs/species/uplisting/doc4453.pdf.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook, Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act.

U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service. 2010. Federal land managers' air quality related values work group (FLAG): phase I report—revised (2010). Natural Resource Report NPS/NRPC/NRR—2010/232. National Park Service, Denver, Colorado.

U.S. Geological Survey (USGS). 1995. Ground Water Atlas of the United States: Arizona, Colorado, New Mexico, Utah. HA 730-C. Prepared by S. G. Robson and E. R. Banta. Available at: http://capp.water.usgs.gov/gwa/ch_c/index.html.

_____. 2002. Executive Summary—Assessment of Undiscovered Oil and Gas Resources of the Uinta-Piceance Province of Utah and Colorado, 2002. U.S. Geological Survey Digital Data Series DDS-69-B.

_____. 2010. Chapter 6—Calculation of Overburden above the Mahogany Bed in the Uinta Basin, Utah and Colorado. U.S. Geological Survey Digital Data Series DDS–69–BB.

_____. 2012a. Website for water quality data at stream gauge 09272400 Green River at Ouray, UT - http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=09272400&agency_cd=USGS&inventory_output=retrieval&rdb_inventory_output=value&TZoutput=0&pm_cd_compare=Greater than&radio_parm_cds=all_parm_cds&format=html_table&qw_attributes=0&qw_sample_wide=wide&rdb_qw_attributes=0&date_format=YYYY-MM-DD&rdb_compression=value&submitted_form=brief_list.

_____. 2012b. Website for average annual flow data at stream gauge 09272400 Green River at Ouray, UT. http://waterdata.usgs.gov/nwis/annual?referred_module=sw&site_no=09272400&por_09272400_2=2512893,00060,2,2009,2012&year_type=W&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list.

University of Utah. 2009. The Structure and Economic Impact of Utah's Oil and Gas Exploration and Production Industry. Bureau of Economic and Business Research, Salt Lake City, Utah. July 2009.

Utah Association of Realtors. 2012. Accessed April 2012 at http://utahrealtors.com/news-center/housing-statistics/quarterly-reports/.

Utah Automated Geographic Reference Center (AGRC). 2013. Utah Oil and Gas Datasets. Accessed October 7, 2013 at http://gis.utah.gov/data/energy/oil-gas/.

Utah Department of Corrections. 2013. Uintah County Jail, The Official Website for the Utah Department of Corrections. Access at http://corrections.utah.gov/visitation_facilities/uintahcountyjail.html.

Utah Department of Environmental Quality – Division of Air Quality (UDEQ-DAQ). 2014. 2013 Uinta Basin Winter Ozone Study: Highlight Report. March 2014 Accessed May 6, 2014 at http://www.deq.utah.gov/locations/uintahbasin/studies/2013study.htm

_____. 2011. "Metdata files question." Email from T. Orth, UDEQ-DAQ, to D. Collins, Kleinfelder, dated October 24, 2011.

Utah Department of Environmental Quality – Division of Water Quality (UDEQ-DWQ). 2002. Utah Department of Environmental Quality. Standards of Quality for Waters of the State. June 1, 2002. [Last accessed November 1, 2007.] Available at: http://www.rules.utah.gov/publicat/code/r317/r317-002.htm.

_____. 2004a. Uinta Watershed Management Unit Water Quality Assessment 2004 305(b).

_____. 2010. TMDLs for Total Dissolved Soils, Selenium, and Boron in the Pariette Draw Watershed. September 28, 2010.

Utah Department of Motor Vehicles (UDMV). 2005. Utah Current Registrations. Offroad. Available online at http://tax.utah.gov/esu/mv-registration/2005vehicle.pdf.

_____. 2008. Utah Current Registrations. Offroad. Available online at http://tax.utah.gov/esu/mv-registration/2008OffroadCountyType.pdf.

_____. 2013. Utah Current Registrations 2013. Off-road Registrations by County and Vehicle Type. Available online at http://tax.utah.gov/esu/mv-registration/2013OffroadCountyType.pdf.

Utah Department of Public Safety (UDPS), Bureau of Criminal Identification. 2009. 2008 Crime in Utah Report. Available online at http://publicsafety.utah.gov/bci/documents/CIU%202008%20book%200810.pdf.

_____. 2011. 2010 Crime in Utah Report. Available online at http://publicsafety.utah.gov /bci/documents/2010CrimeinUtahReport_002.pdf.

Utah Department of Public Safety (UDPS), Office of Highway Safety. 2008, 2009, 2010. Utah Crash Summary. Accessed July 2012 at http://publicsafety.utah.gov/highwaysafety/1997-2005.html.

Utah Department of Transportation (UDOT). 2005, 2007, 2009, 2011. Traffic on Utah Highways (AADT). Accessed July 2012 at http://www.udot.utah.gov/main/f?p=100:pg:0::::V,T:,529.

Utah Department of Workforce Services (UDWS). 2011. Utah Counties in Review 2010. Updated September 2011. Available online at http://jobs.utah.gov/wi/pubs/countiesinreview.pdf.

Utah Division of Indian Affairs. 2013. Ute Indian Tribal Profile. Accessed March 8, 2013 at http://indian.utah.gov/utah_tribes/ute.html.

Utah Division of Oil, Gas and Mining (UDOGM). 2013a. Utah Natural Gas Production – By Year. Accessed January 7, 2013 at http://oilgas.ogm.utah.gov/Statistics/PROD_Gas_annual.cfm.

_____. 2013b. Annual Production Summary - Fields. Accessed August 30, 2013. Available online at: http://oilgas.ogm.utah.gov/Data_Center/LiveData_Search/prod_fld.cfm.

_____. 2013c. Drilling Commenced (Wells Spudded) - by County. Available online at: http://oilgas.ogm.utah.gov/Statistics/SPUD_county.cfm. Accessed October 1, 2013.

Utah Division of Water Resources (UDWaR). 1999. Utah State Water Plan, Uintah Basin. Utah Department of Natural Resources. Utah Board of Water Resources, Salt Lake City, Utah. December 1999.

Utah Division of Wildlife Resources (UDWR). 1998. Inventory of Sensitive Species and Ecosystems in Utah. Inventory of Sensitive Vertebrate and Invertebrate Species: A Progress Report – Revised August 18, 1998. Prepared for Utah Reclamation Mitigation and Conservation Commission and the U.S. Department of the Interior, Cooperative Agreement UC-95-0015. Salt Lake City, Utah.

_____. 2000. Utah Upland Game Annual Report 2000. Publication No. 04-19. State of Utah Natural Resources, Division of Wildlife Resources. Prepared by McFarlane, L.A., DeBloois, D.L., DeBloois, G., Hill. H, and Mitchell, D.L. Access Online at: http://wildlife.utah.gov/uplandgame/annualreports/2000.pdf.

_____. 2002. Strategic Management Plan for Sage-Grouse. Publication 02-20. State of Utah Department of Natural Resources, UDWR Salt Lake City, Utah.

_____. 2003. Vertebrate information compiled by the Utah Natural Heritage Program: A Progress Report. Publication number 03-45. State of Utah Department of Natural Resources, UDWR Salt Lake City, Utah. 336 pp.

_____. 2005. Rocky Mountain Elk (*Cervus elaphus nelsoni*), Wildlife Notebook series No. 12. Amy Adams, Project Wild. Access online at http://wildlife.utah.gov/publications/pdf/2010_elk.pdf.

_____. 2006a. Southeastern Utah's Mammals. State of Utah Department of Natural Resources, UDWR Salt Lake City, Utah.

_____. 2006b. Utah Sensitive Species List. State of Utah Department of Natural Resources, UDWR Salt Lake City, Utah.

_____. 2007. Utah Conservation Data Center. State of Utah Department of Natural Resources, UDWR Salt Lake City, Utah. Available Online at http://dwrcdc.nr.utah.gov/ucdc.

_____. 2008. Statewide Management Plan For Mule Deer. Utah Division Of Wildlife Resources. Access online at http://wildlife.utah.gov/hunting/biggame/pdf/mule_deer_plan.pdf.

_____. 2009a. Utah Pronghorn Statewide Management Plan. Utah Division Of Wildlife Resources, Department Of Natural Resources. Available online at: http://wildlife.utah.gov/hunting/biggame/pdf/Statewide_prong_mgmt_2009.pdf.

_____. 2009b. Utah Greater Sage-grouse Management Plan. Utah Department of Natural Resources, Division of Wildlife Resources. Publication 09-17. Salt Lake City, Utah.

_____. 2010a. Utah Big Game Annual Report. Utah Department of Natural Resources, Division of Wildlife Resources. Publication Number 11-23. Prepared by Bernales H., Hersey K.R., and Aoude, A.

_____. 2010b. Utah Comprehensive Wildlife Conservation Strategy. Utah Division of Wildlife Resources Publication Number 05-19. Access online at http://wildlife.utah.gov/cwcs/11-03-09_utah_cwcs_strategy.pdf.

_____. 2011a. Utah Big Game Annual Report 2010. Bernales, H.H., Hersey, K.R., and Aoude, A. Utah Division of wildlife Resources, Department of Natural Resources. Available online at http://wildlife.utah.gov/hunting/biggame/pdf/annual_reports/10_bg_report.pdf.

_____. 2011b. Utah Conservation Data Center-Utah Sensitive Species: List and Appendices March 29, 2011. Available online at http://dwrcdc.nr.utah.gov/ucdc/ViewReports/sslist.htm.

Utah Energy Office. 2004. Economic Impact Analysis of the Drilling and Completion of a Natural Gas Well in the Uinta Basin. Prepared by the Utah Energy Office, Utah Department of Natural Resources. August 2004.

Utah Geologic Survey (UGS). 1997. Earthquakes and Utah. Public Information Series 48. Utah Geological Survey, Division of Utah Department of Natural Resources.

Utah Governor's Office of Economic Development (GOED). 2006. Utah Office of Rural Development. Natural Resources Impact Working Group. Draft Report. Cited in BLM 2010c.

Utah Governor's Office of Planning and Budget (GOPB). 2008. 2008 Baseline Projections. Available online: http://www.envisionutah.org/2008%20GOPB%20Baseline_Demographics_Economy.pdf.

_____. 2009. 2009 Economic Report to the Governor. Available online at http://governor.utah.gov/dea/ERG/2009ERG.pdf.

_____. 2011. 2011 Economic Report to the Governor. Available online at http://governor.utah.gov/dea/ERG/2011ERG.pdf.

_____. 2012. Employment by Area 1990-2060 – 2012 Baseline Projections. Internet website: http://governor.utah.gov/dea/projections.html.

Utah Native Plant Society (UNPS). 2007. Utah Rare Plant Guide. Salt Lake City, Utah.

_____. 2009. Rare Plants List. Salt Lake City, UT. Last accessed October 24, 2012. Available online at http://www.unps.org/index.html?PAGES/rare.html.

Utah Seismic Safety Commission (USSC). 2008. Putting Down Roots in Earthquake Country: Your Handbook for Earthquakes in Utah.

Utah State Legislature. 2007. Utah Noxious Weed Act, Title 4, Chapter 17. Available online at http://le.utah.gov/~code/TITLE04/04_17.htm.

Utah State Tax Commission. 2011. Annual Report Fiscal Year 2010. Available online at http://tax.utah.gov/commission/reports/fy10report.pdf.

_____. 2012a. Utah Code Title 59, Chapter 12, Sales & Use Tax Act, Combined Sales and Use Tax Rates. Available online at http://tax.utah.gov/sales/rate/12q2combined.pdf.

_____. 2012b. Annual Report Fiscal Year 2011. Available online at http://tax.utah.gov/commission/reports/fy11report.pdf.

Utah State Tax Commission, Property Tax Division. 2011. 2010 Annual Statistical Report. Available online at http://propertytax.utah.gov/library/pdf/statistics/yearendreports/2010/2010annual.pdf.

Utah State University, Energy Dynamics Laboratory (USU EDL). 2011: Final Report: Uinta Basin Winter Ozone and Air Quality Study, December 2010 - March 2011. Energy Dynamics Laboratory, Utah State University Research Foundation (USURF). Submitted by Martin, R., K. Moore, M. Mansfield, S. Hill, K. Harper, and H. Shorthill. Released June 14, 2011. Document Number: EDL/11-039. Available at rd.usu.edu/files/uploads/ubos_2010-11_final_report.pdf.

Utah Travel Industry. 2012. Other Playgrounds, Pariette Wetlands. Utah Travel Council. Accessed September 14, 2012 at http://www.utah.com/playgrounds/pariette_wetlands.htm.

Van Dyke, F. G., and W. C. Klein. 1996. Response of Elk to Installation of Oil Wells. Journal of Mammalogy 77: 1028-1041.

Vanden Berg, M.D., D.R. Lehle, S.M. Carney, and C.D. Morgan. 2013. Geological Characterization of the Birds Nest Aquifer, Uinta Basin, Utah: Assessment of the Aquifer's Potential as a Saline Water Disposal Zone. Special Study 147 of the Utah Geological Survey, a Division of Utah Department of Natural Resources. CD (47 p., 31 pl. [contains GIS data]), ISBN: 978-1-55791-874-1. Access online at http://geology.utah.gov/online/ss/ss-147/ss-147.pdf.

Walker, B.L., D.E. Naugle, and K.E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71:2644-2654.

Walters, R.E. 1983. Utah bird distribution: latilong study 1983. Utah Division of Wildlife Resources, Salt Lake City, UT.

Weiss, M. P., I. J. Witkind, and W. B. Cashion. 2003. Geologic Map of the Price 30' x 60' Quadrangle, Carbon, Duchesne, Uintah, Utah, and Wasatch Counties, Utah. Utah Geological Survey, Division of Utah Department of Natural Resources.

Weitz, Jerry. 2003. Jobs-Housing Balance. Planning Advisory Service Report No. 516. Chicago: American Planning Association.

Welsh, S. L., N. D. Atwood, S. Goodrich, and L. C. Higgins, eds. 2003. *Sclerocactus*. In: *A Utah Flora, third edition, revised*. Print Services, Brigham Young University, Provo, UT. 912 pp.

Western Regional Climate Center (WRCC). 2012a. "Myton, Utah (425969) Period of Monthly Climate Summary, Period of Record: 8/27/1915 to 2/25/2012." Accessed May 16, 2012 at http://www.wrcc.dri.edu/cgi-bin/cliRECtM.pl?ut5969.

_____. 2012b. "Myton, Utah Period of Record General Climate Summary – Precipitation." Table Updated Apr 16, 2012. Accessed May 16, 2012 at http://www.wrcc.dri.edu/cgi-bin/cliGCStP.pl?ut5969.

_____. 2012c. "Myton, Utah Period of Record General Climate Summary – Temperature." Table Updated Apr 16, 2012. Accessed May 16, 2012 at http://www.wrcc.dri.edu/cgi-bin/cliGCStT.pl?ut5969.

Wheeler, B.K., C.M. White and J.M. Economidy. 2003. Raptors of Western North America: The Wheeler Guide.

White River Resources Corporation. 2004. North Hill Creek 3-D Seismic Exploration Project, Final Technical Report. Prepared for the Ute Indian Tribe by the U.S. Department of Energy, ID Number DE-FG26-00BC15193.

Williams, D. 2013. Electronic mail to Terry Farmer, Kleinfelder, January 3, 2013.

Winterfeld, G. 2011. Paleontological evaluation of the Newfield Oil and Gas Company's Monument Buttes 3D seismic survey area, Duchesne County, northeastern Utah. Paleontological Resources Letter Report EVG UT 4-2011. Erathem-Vanir Geological Consultants, Pocatello, ID. Dated August 9, 2011. 35 pp.

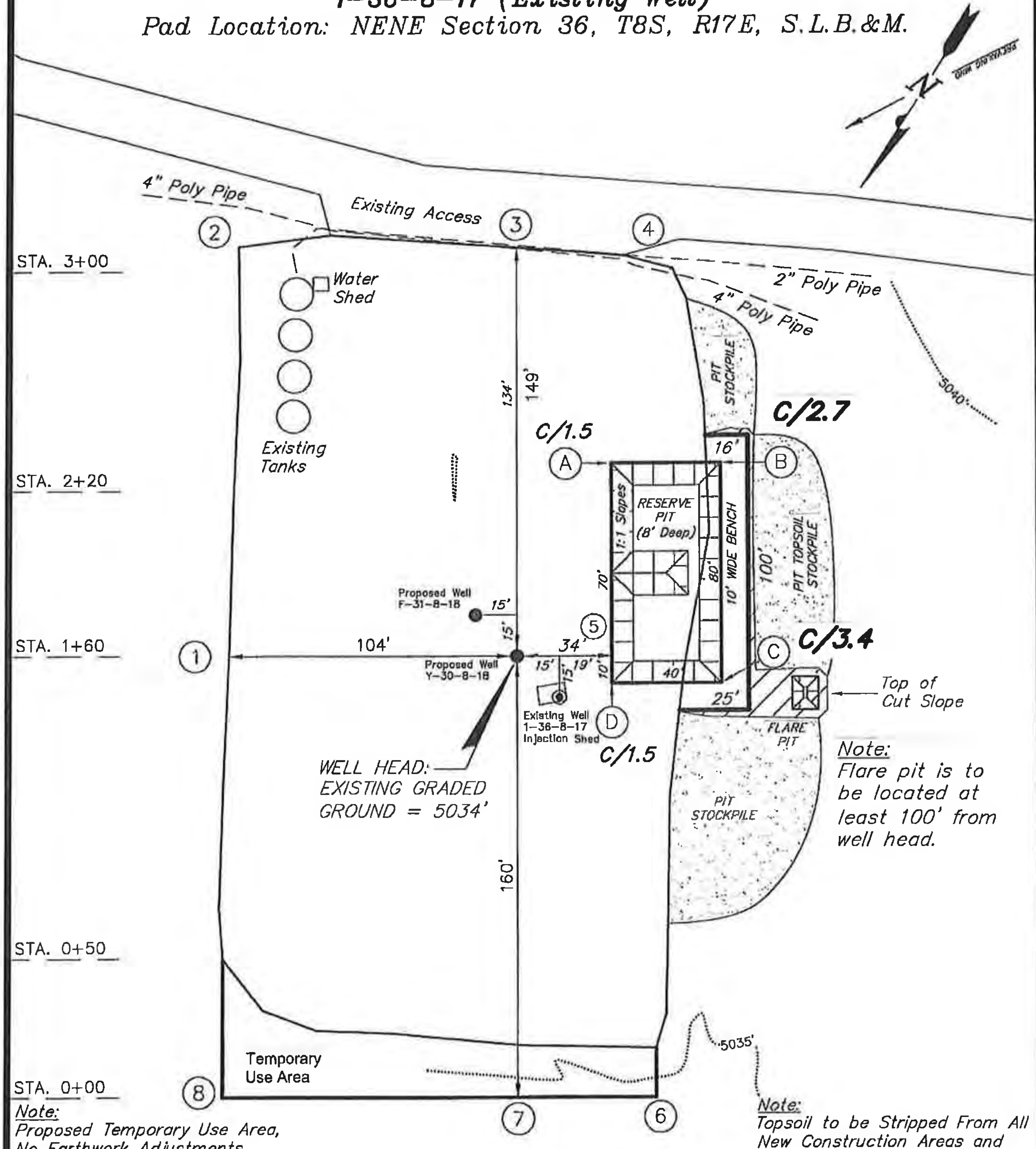
ATTACHMENT 1 - FIGURES

NEWFIELD EXPLORATION COMPANY

LOCATION LAYOUT

Y-30-8-18 (Proposed Well)
F-31-8-18 (Proposed Well)
1-36-8-17 (Existing Well)

Pad Location: NENE Section 36, T8S, R17E, S.L.B.&M.



Note: Flare pit is to be located at least 100' from well head.

Note: Proposed Temporary Use Area, No Earthwork Adjustments required (0.08 Acres)

Note: Topsoil to be Stripped From All New Construction Areas and Proposed Stock Pile Locations

SURVEYED BY: C.D.S.	DATE SURVEYED: 01-24-11	VERSION:	Tri State Land Surveying, Inc. (435) 781-2501 180 NORTH VERNAL AVE. VERNAL, UTAH 84078
DRAWN BY: F.T.M.	DATE DRAWN: 03-29-11	V1	
SCALE: 1" = 50'	REVISED:		

NEWFIELD EXPLORATION COMPANY

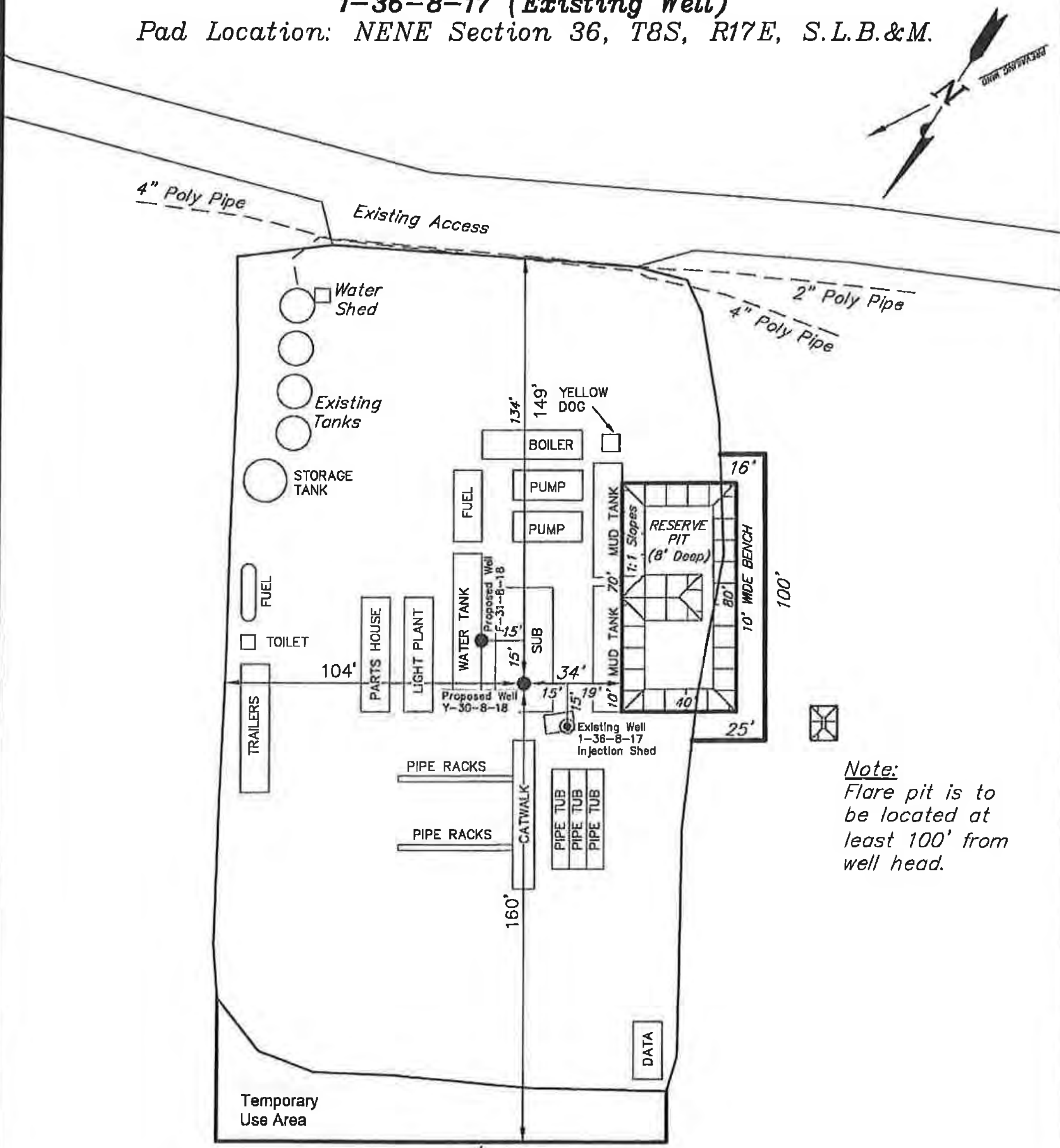
TYPICAL RIG LAYOUT

Y-30-8-18 (Proposed Well)

F-31-8-18 (Proposed Well)

1-36-8-17 (Existing Well)

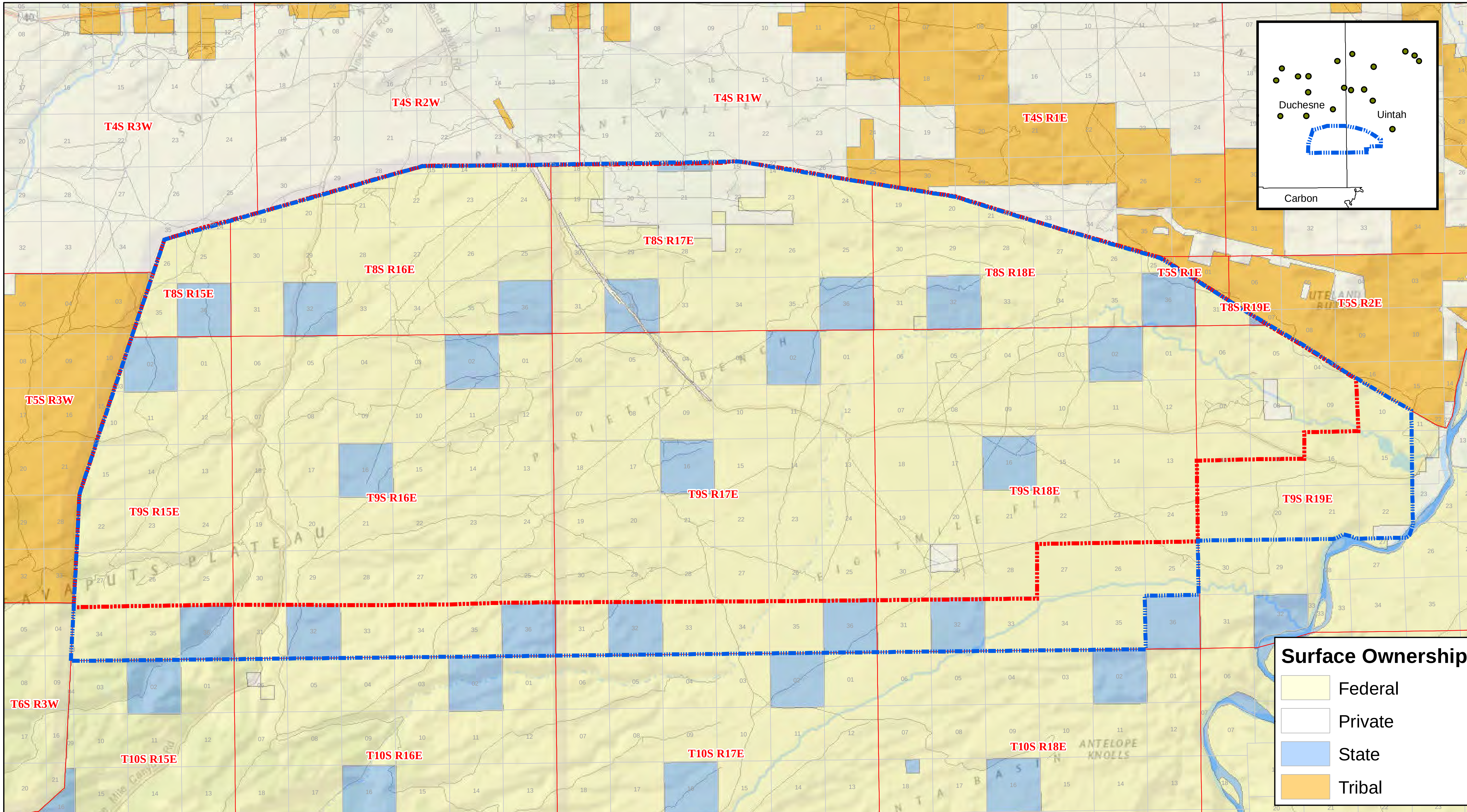
Pad Location: NENE Section 36, T8S, R17E, S.L.B.&M.



Note: Flare pit is to be located at least 100' from well head.

Proposed Expandable Area No Earth Work Required (0.08 = Acres)

SURVEYED BY: C.D.S.	DATE SURVEYED:	01-24-11	VERSION:	Tri State Land Surveying, Inc. (435) 781-2501
DRAWN BY: F.T.M.	DATE DRAWN:	03-29-11	V1	180 NORTH VERNAL AVE. VERNAL, UTAH 84078
SCALE: 1" = 50'	REVISED:			



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

- Project Area Boundary
- Unit Boundary
- Cities

Base Map: ESRI Online Map
Land Ownership Data: Utah
SGID ArcSDE Database (2013)

N W E S

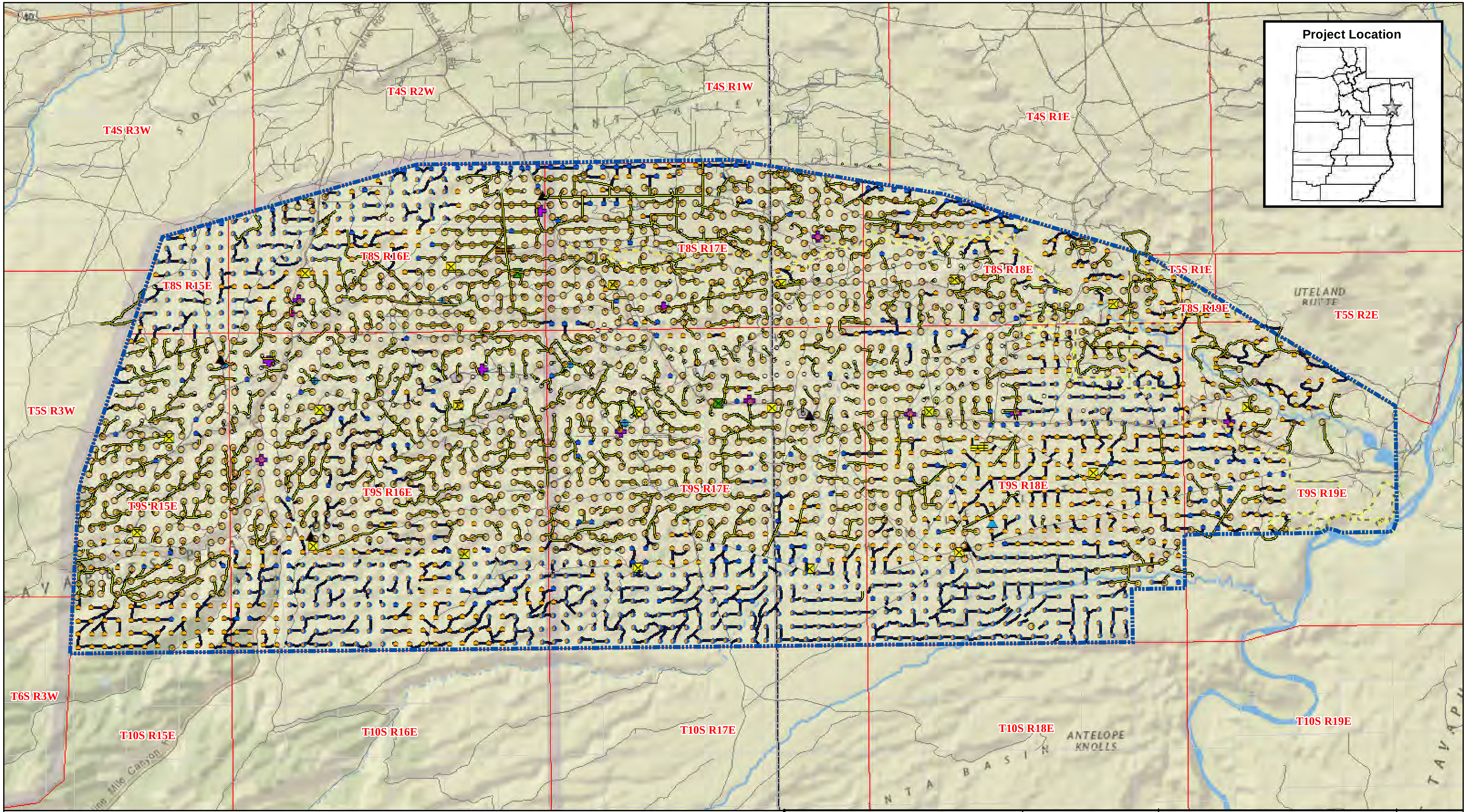
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/12/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	SurfaceOwnership.mxd

Newfield Exploration Company
Monument Butte EIS

Monument Butte Project Area

FIGURE
1.1-1



Legend

- Project Boundary
- Existing Well Location to be Expanded for Deep Gas Well Pad
- Proposed Deep Gas Well Pad
- Proposed Green River Formation Well Pad
- Proposed Green River Well Pad & Expansion for Deep Gas Well Pad
- Existing Road to be Upgraded with Co-located ROW for Pipeline & Powerline Corridors
- Proposed Conceptual Co-located ROW for Road, Pipeline, and Powerline Corridors
- Existing Gas Processing Plant
- Proposed Gas Processing Plant
- Existing Water Injection Facility
- Proposed Water Injection Facility
- Existing Green River Compressor Station
- Proposed Green River Compressor Station
- Proposed Deep Gas Compressor Station
- Existing Central Tank Battery
- Fresh Water Collector Well
- Proposed Pump Station
- Proposed GOSP
- County Boundary
- Pariette ACEC

0 0.5 1 2 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

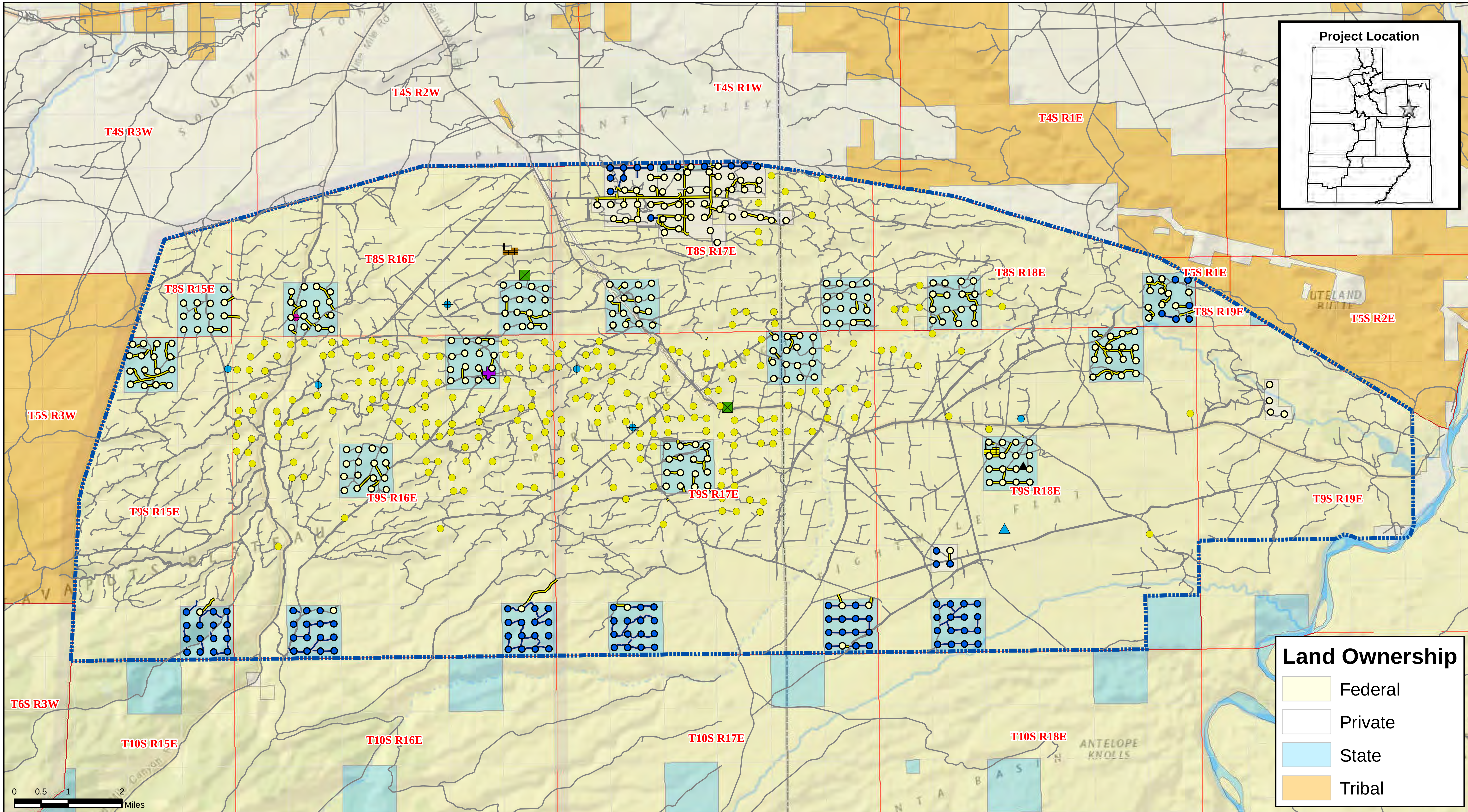
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/10/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	ProposedAction_AlternativeA.mxd

Monument Butte EIS

Newfield Production Company
Alternative A - Proposed Action

FIGURE
2-1



Legend

- Project Boundary
- Existing Well Pads to be Expanded
- Proposed New Green River 40 Acre Spacing Well Pads
- Wells Remaining to be Drilled Under Other Approved or Proposed Newfield Projects
- Fresh Water Collector Well
- Existing Green River Compressor Station
- Proposed Pump Stations
- Existing Water Injection Facility
- Proposed Water Injection Facility
- Proposed Gas Processing Plant
- Existing Gas Processing Plant
- Proposed GOSP
- Existing Road to be Upgraded with Co-located ROW for Road, Pipeline & Powerline Corridors
- Proposed Conceptual Co-located ROW for Road, Pipeline & Powerline Corridors
- County Boundary

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

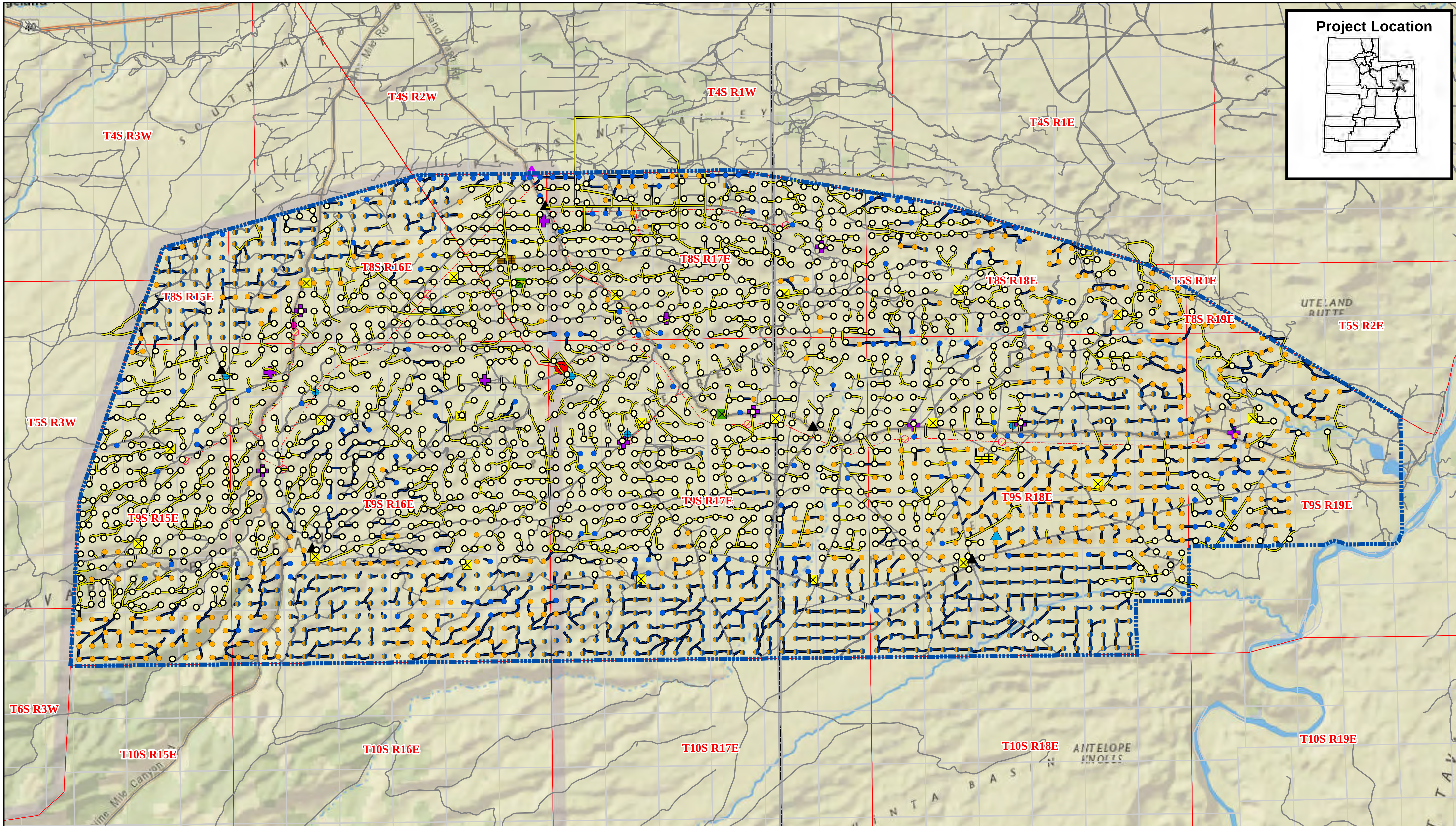
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/6/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	AlternativeB_Template.mxd

Monument Butte EIS

Newfield Production Company
Alternative B - No Action

FIGURE
2-2



Legend

- Proposed Green River Well Pad & Expansion for Deep Gas Well Pad
- Proposed Deep Gas Well Pad
- Proposed Green River Formation Well Pad
- Existing Well Location to be Expanded for Deep Gas Well Pad
- Proposed Conceptual Co-located ROW for Road, Pipeline, and Powerline Corridors
- Existing Road to be Upgraded with Co-located ROW for Pipeline & Powerline Corridors
- Project Boundary
- Existing Roads
- Existing 69kV Pole Line
- Existing Generating Station
- 138kV TO 69kV Transfer Generation Station
- Proposed 69kV Pole Line
- Proposed Generation Station
- Existing Gas Processing Plant
- Proposed Gas Processing Plant
- Existing Water Injection Facility
- Proposed Water Injection Facility
- Existing Green River Compressor Station
- Proposed Green River Compressor Station
- Proposed Deep Gas Compressor Station
- Fresh Water Collector Well
- Proposed Pump Station
- Proposed GOSP
- County Boundary

0 0.5 1 2 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

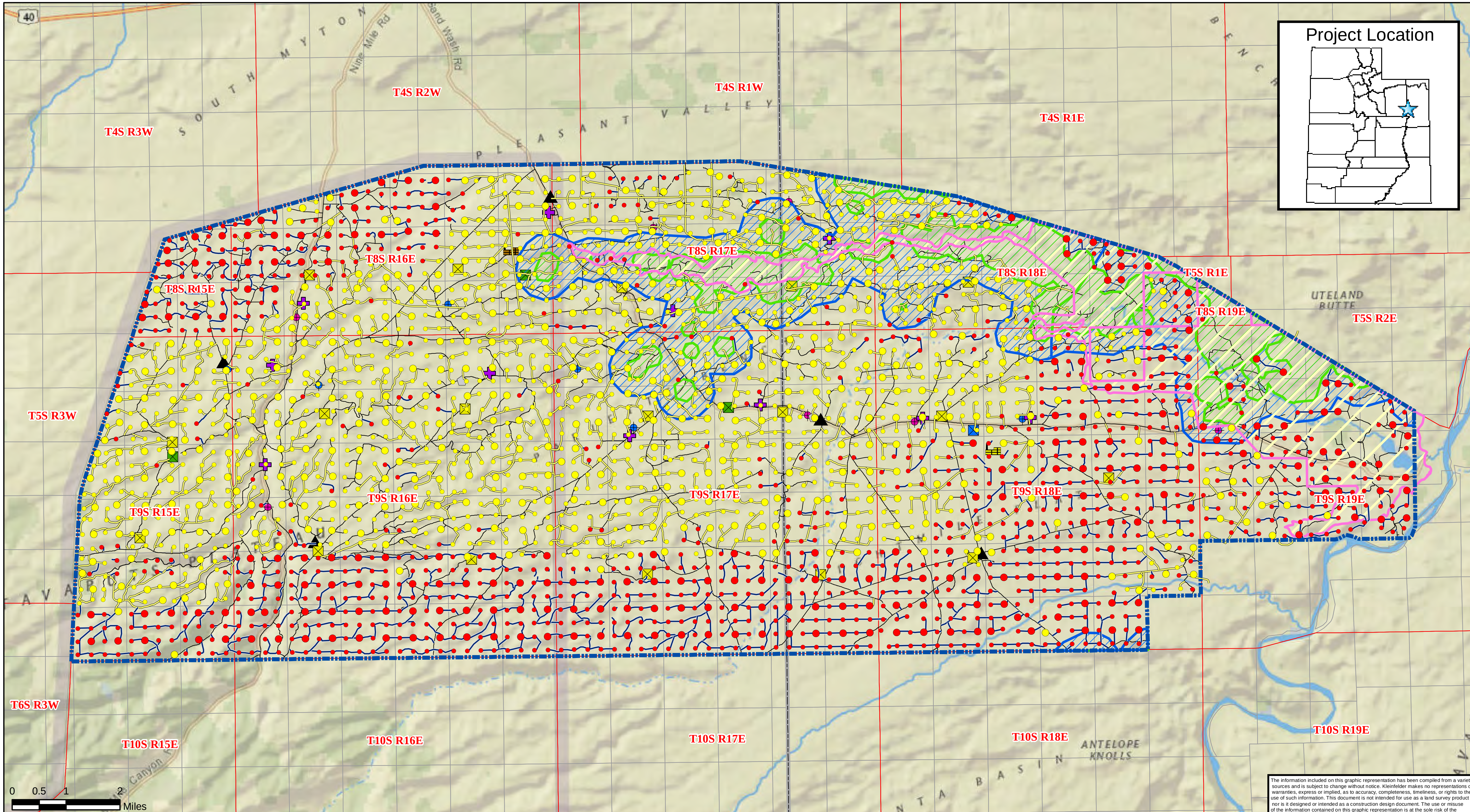
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/10/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	AlternativeC_20130905.mxd

Monument Butte EIS

Newfield Production Company
Alternative C - Field-Wide Electrification

FIGURE
2-3



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

- Project Boundary
- ACEC Boundary
- Existing Well Pad (Large)
- Existing Well Pad (Small)
- Proposed Well Pad (Large)
- Proposed Well Pad (Small)
- Existing Central Tank Battery
- Proposed Deep Gas Compressor Station
- Existing Green River Compressor Station
- Proposed Green River Compressor Station
- Proposed Pump Station
- Existing Gas Processing Plant
- Proposed Gas Processing Plant
- Existing Water Injection Facility
- Proposed Water Injection Facility
- County Boundary
- Proposed GOSP
- Existing ROWs (Alt D)
- Conceptual ROWs (Alt D)
- Level 2 CCA
- Level 1 CCA

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	10/17/2014
DRAWN BY:	A.Leonard
CHECKED BY:	D.Martin
FILE NAME:	AlternativeD_CactusComponent_v4.mxd

Monument Butte EIS

Newfield Production Company
Alternative D - Resource Protection

FIGURE
2-4

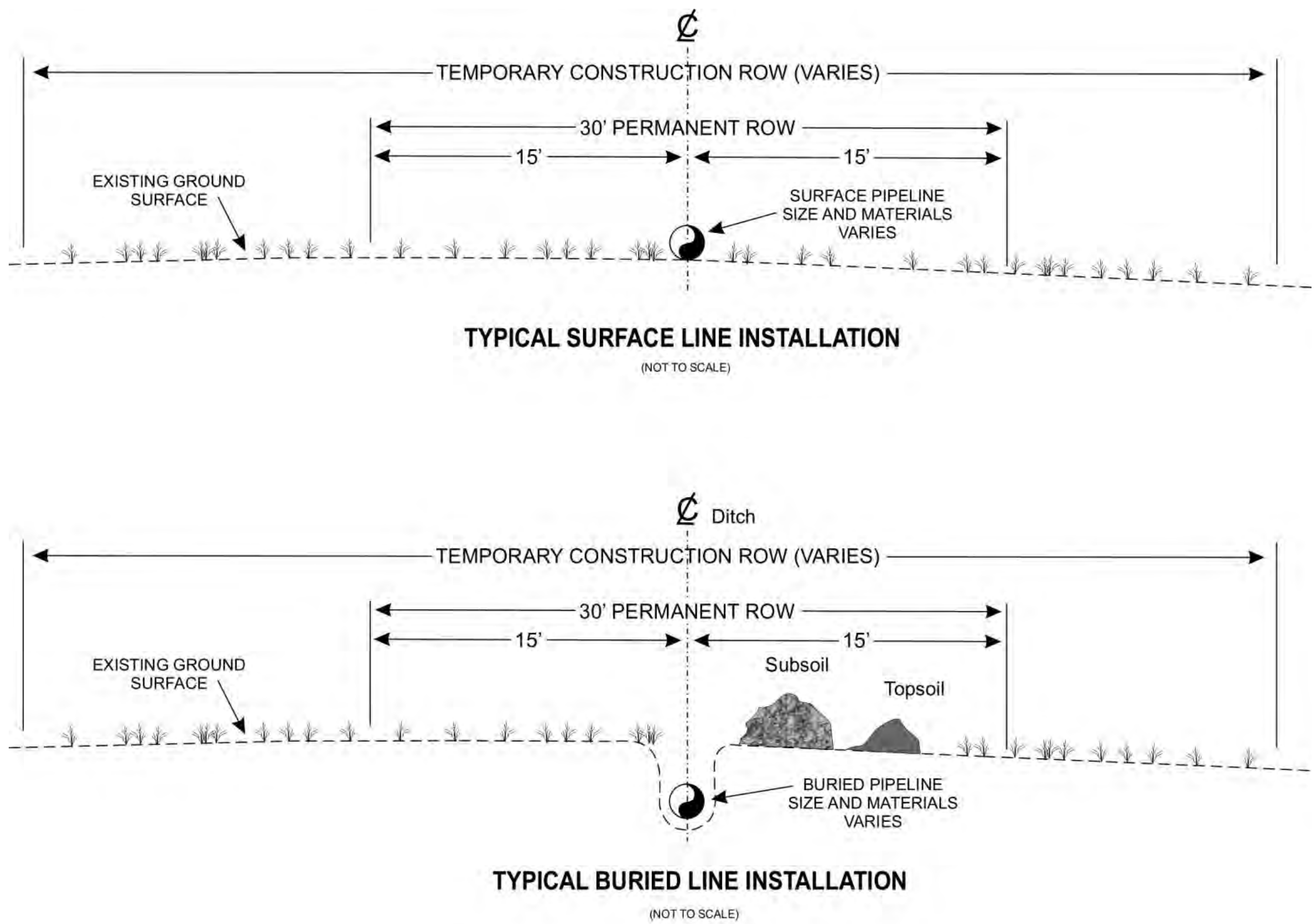


Figure 2.1.2.4-1. Typical "Cross-Country" Pipeline Installation Scenarios with Width Specifications

Figure 2.2.2.1-1. Typical Single Well Pad Layout

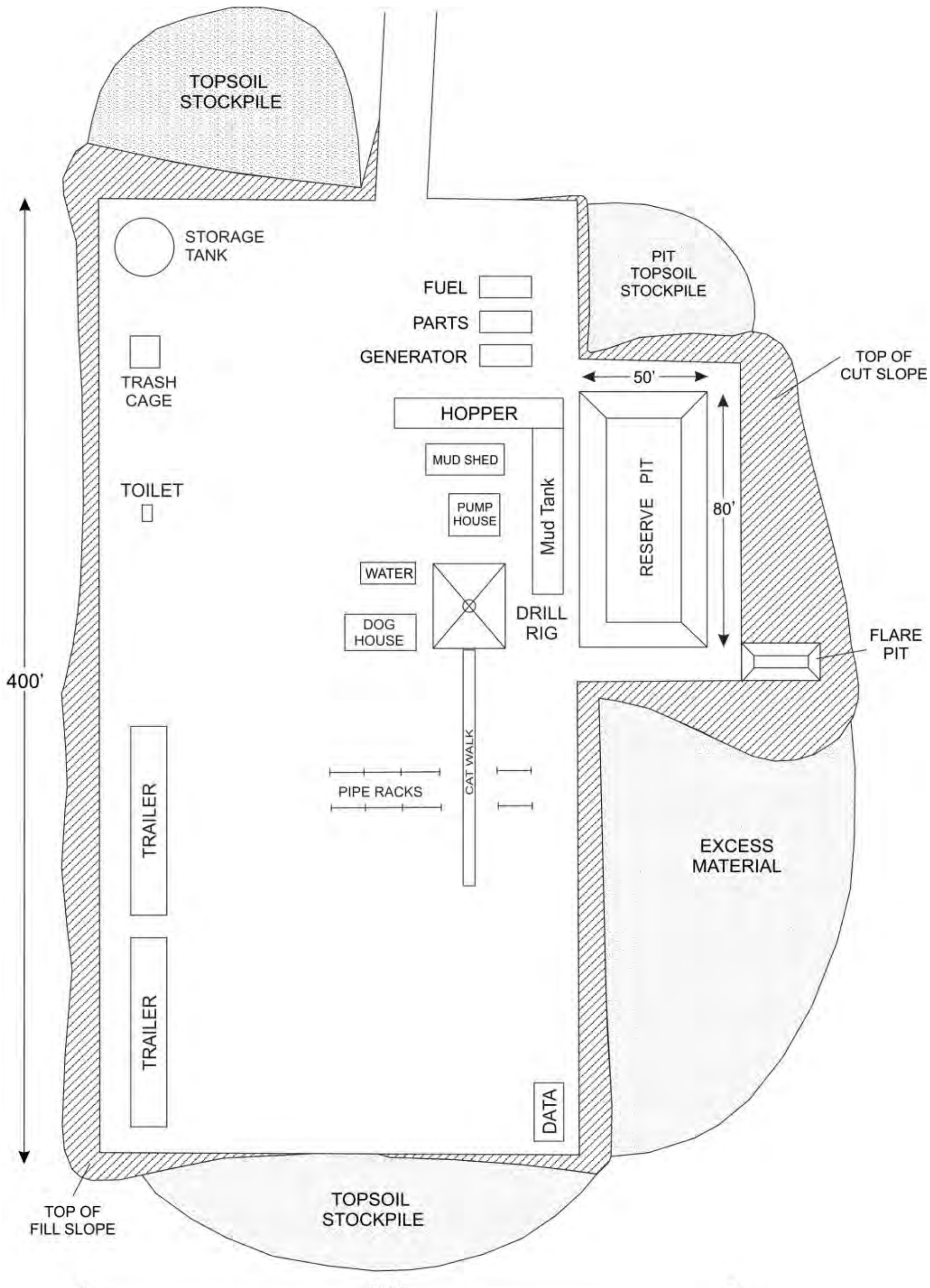
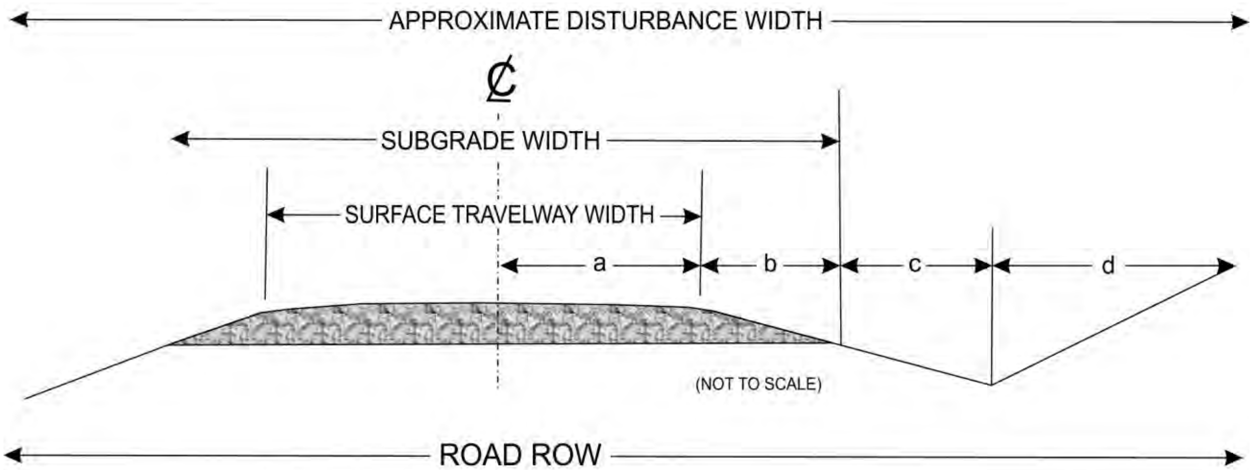


Figure 2.2.2.3-1. Typical Roadway Cross Section with Width Specifications



	Minimum Subgrade Width (ft.)	Minimum Surfaced Travelway Width (ft.)	a (ft.)	b (ft.)	c (ft.)	d (ft.)	Approximate Disturbance Width (ft.)	Total ROW Width (ft.)	Design Speed (mph)
Resource Road	16	12	6	2	4	8	40	50	15-30
Local Road	24	20	10	2	4	8	48	55	20-50
Collector Road	28	24	12	2	4	8	52	60	30-50

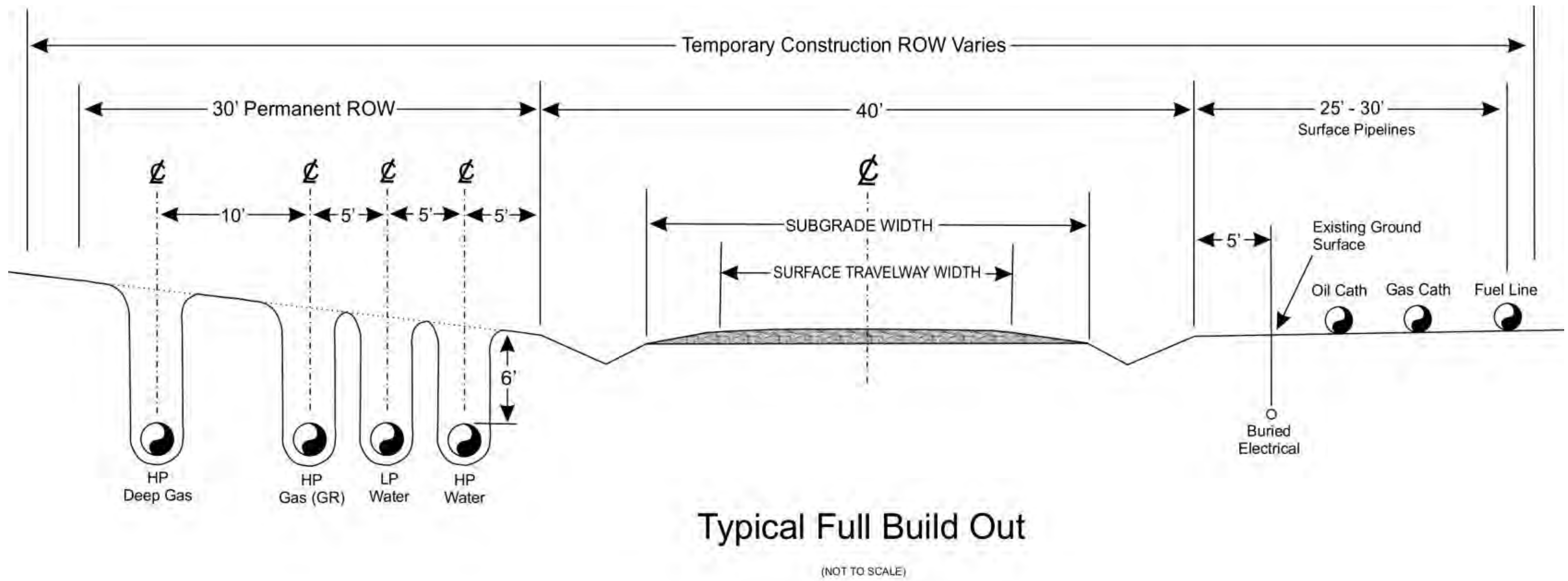


Figure 2.2.2.3-2 Typical Roadway Cross-section with Pipeline Installation Along Side Road.

Figure 2.2.2.5-1. Typical Compressor Station Layout

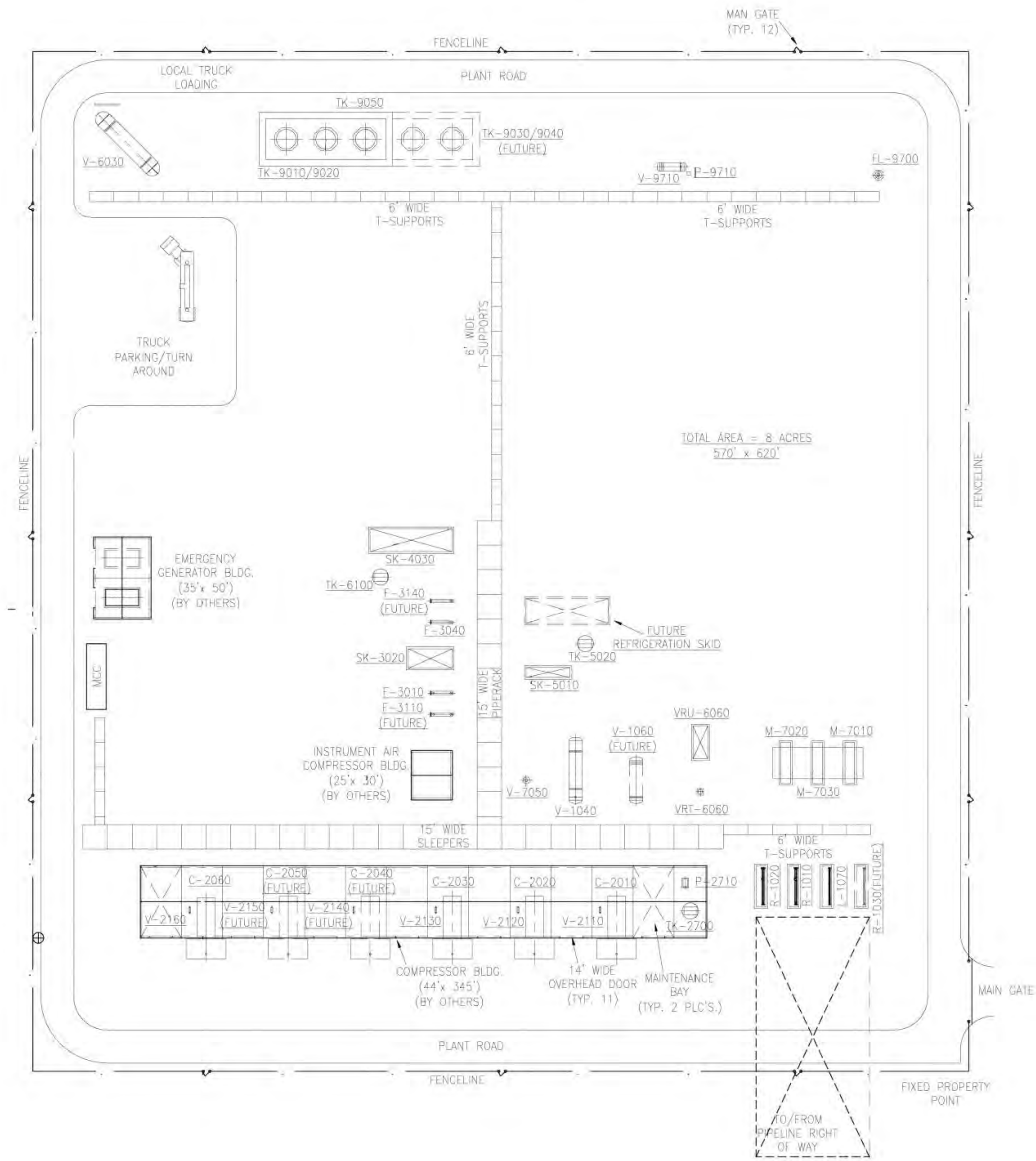


Figure 2.2.2.8-1. Typical Gas and Oil Separation Plant Layout

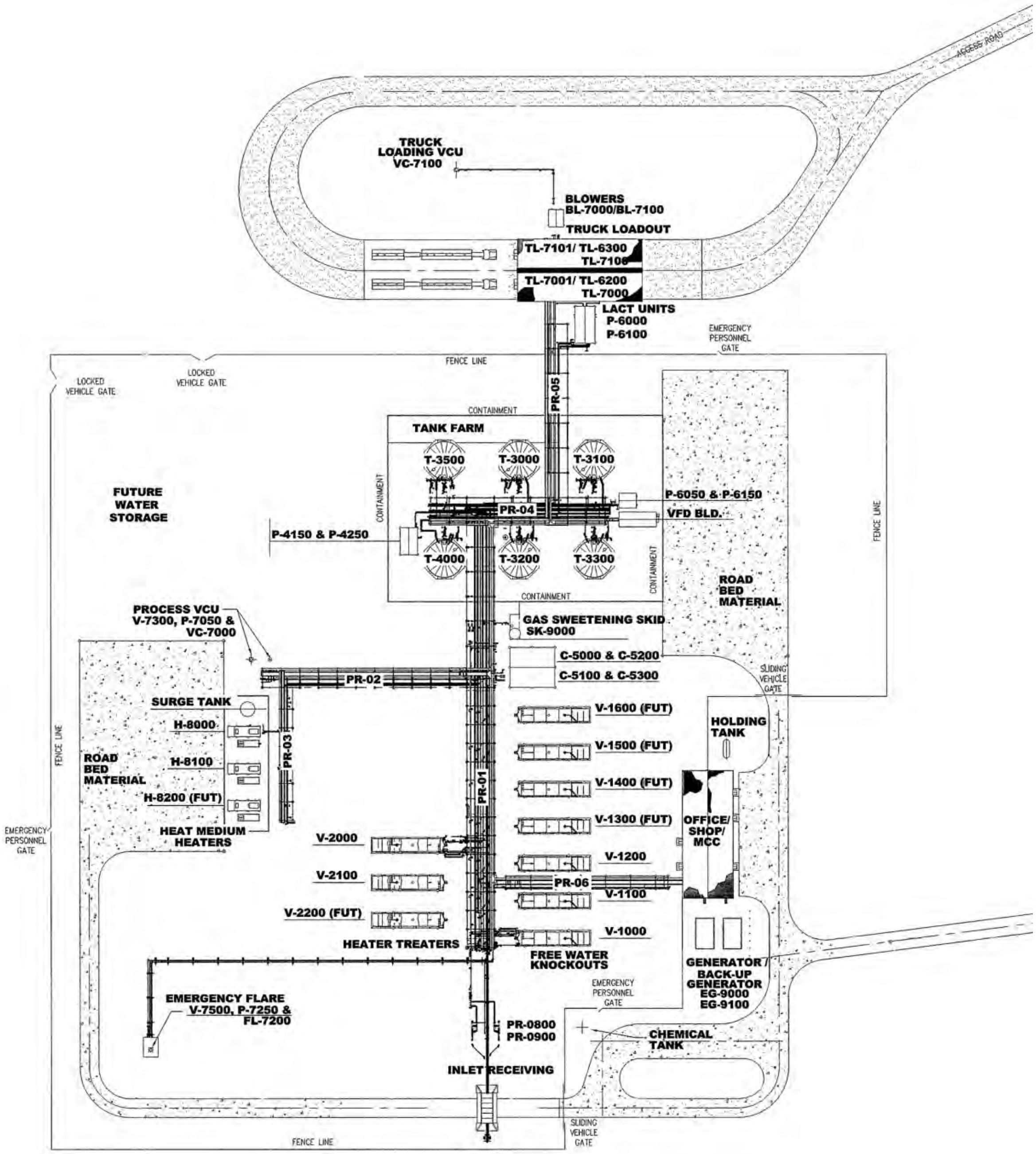


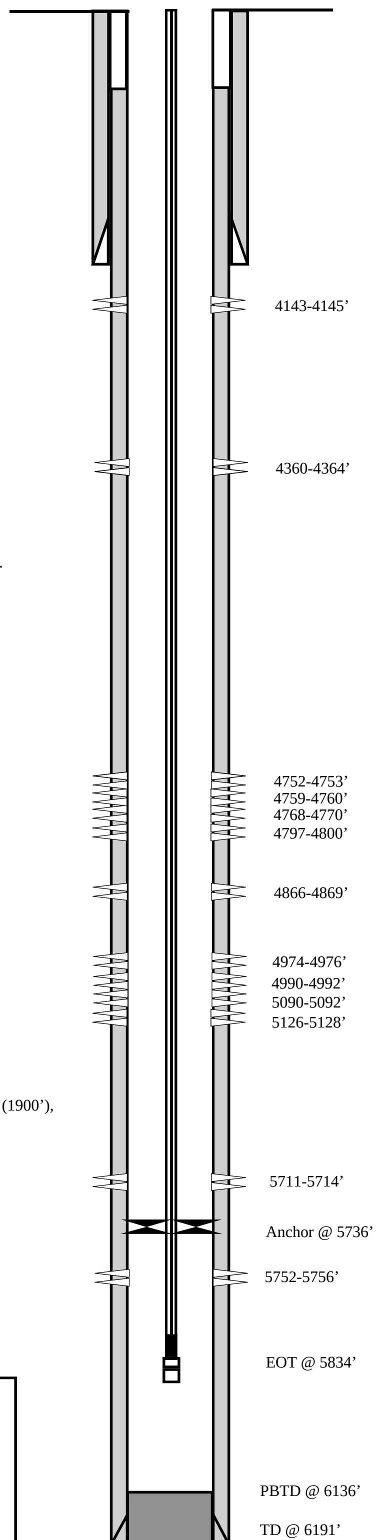
Figure 2.2.3-1 – Example Well Bore Diagram (GMBU C-2-9-17)

Spud Date: 7/15/2011

Put on Production: 9/7/2011

GL: 5006’ KB: 5018’

Wellbore Diagram



SURFACE CASING

CSG SIZE: 8-5/8”

GRADE: J-55

WEIGHT: 24#

LENGTH: 16 jts. (716.42’)

DEPTH LANDED: 728.74’ KB

HOLE SIZE: 12-1/4”

CEMENT DATA: 350, sxs Class “G” cmt

TOC: Surface (7 bbls cmt circulated to pit 7/15/2011)

PRODUCTION CASING

CSG SIZE: 5-1/2”

GRADE: J-55

WEIGHT: 15.5#

LENGTH: 141 jts. (6165.04’)

DEPTH LANDED: 6182.65’ KB

HOLE SIZE: 7-7/8”

CEMENT DATA: 260 sxs Prem. Lite II mixed & 400 sxs 50/50 POZ.

TOC: 29 ft FS (CBL 8/22/2011)

TUBING

SIZE/GRADE/WT.: 2-7/8” / J-55 / 6.5#

NO. OF JOINTS: 184 jts. (5724.2’)

TUBING ANCHOR: 5736.2’ KB

NO. OF JOINTS: 1 jt. (31.4’)

SEATING NIPPLE: 2-7/8” (1.1’)

SN LANDED AT: 5770.4’ KB

NO. OF JOINTS: 2 jts. (61.8’)

NOTCHED COLLAR: 5833.3’ KB

TOTAL STRING LENGTH: EOT @ 5834’ KB

SUCKER RODS

POLISHED ROD: 1-1/2” x 30’ Spray Metal Polished Rod

SUCKER RODS: 1 – 7/8” x 2’ Pony Rod, 76 – 7/8” 4per Guided Rods (1900’), 145 – ¾” 4per Guided Rods (3625’), 5 – 1½” Sinker Bars (125’), 5 – 1” Stabilizer Bars (20’)

PUMP SIZE: 2-1/2” x 1-3/4” x 20’ x 21’ x 24’ RHAC

STROKE LENGTH:

PUMP SPEED: 5 SPM

FRAC JOB

8/22/2011	5711-5756’	**Frac CP1 and CP2, sands as follows:** Frac with 39387# 20/40 white sand in 260 bbls Lightning 17 fluid; 434 bbls total fluid to recover.
8/31/2011	4974-5128’	**Frac C, B1 and B2, sands as follows:** Frac with 46023# 20/40 white sand in 300 bbls Lightning 17 fluid; 428 bbls total fluid to recover.
8/31/2011	4752-4869’	**Frac D1, D2 and DS3, sands as follows:** Frac with 199586# 20/40 white sand in 1222 bbls Lightning 17 fluid; 1348 bbls total fluid to recover.
8/31/2011	4143-4364’	**Frac GB2 and GB6, sands as follows:** Frac with 50997# 20/40 white sand in 311 bbls Lightning 17 fluid; 418 bbls total fluid to recover.

PERFORATION RECORD

5752-5756’	3 JSPF	12 holes
5711-5714’	3 JSPF	9 holes
5126-5128’	3 JSPF	6 holes
5090-5092’	3 JSPF	6 holes
4990-4992’	3 JSPF	6 holes
4974-4976’	3 JSPF	6 holes
4866-4869’	3 JSPF	9 holes
4797-4800’	3 JSPF	9 holes
4768-4770’	3 JSPF	6 holes
4759-4760’	3 JSPF	3 holes
4752-4753’	3 JSPF	3 holes
4360-4364’	3 JSPF	12 holes
4143-4145’	3 JSPF	6 holes

NEWFIELD

Greater Monument Butte C-2-9-17

502’FNL & 1961’ FEL (NW/NE)

Section 2, T9S, R17E

Uintah County, Utah

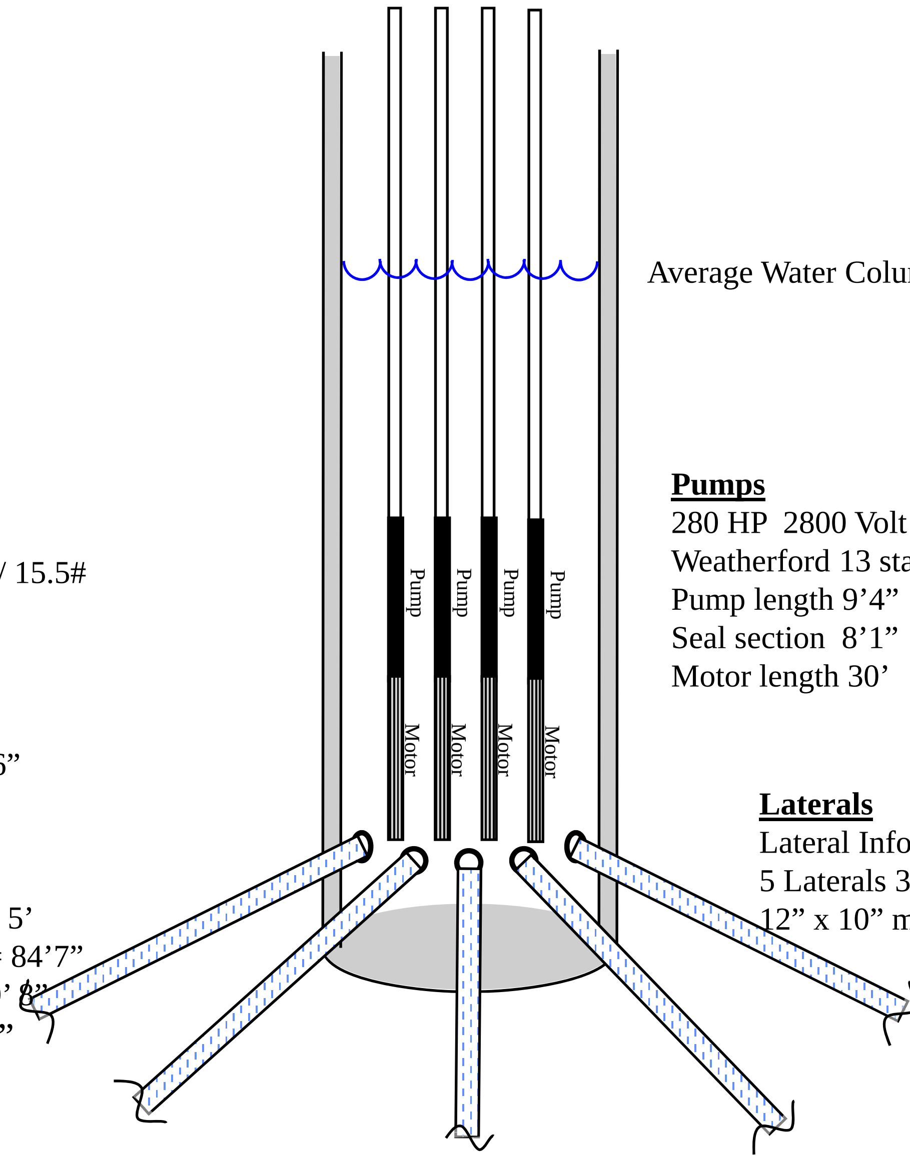
API #43-047-51551; Lease #ML-45555

TW 11/29/2011
Updated by JKP 12/1/2011

Figure 2.2.8.3-1 Example Water Collector Well

Casing
Cement Caisson
16’ OD 13 ½’ ID
75’ deep from GL
11’ above ground

Casing
Cement Caisson
16’ OD 13 ½’ ID
75’ deep from GL
11’ above ground

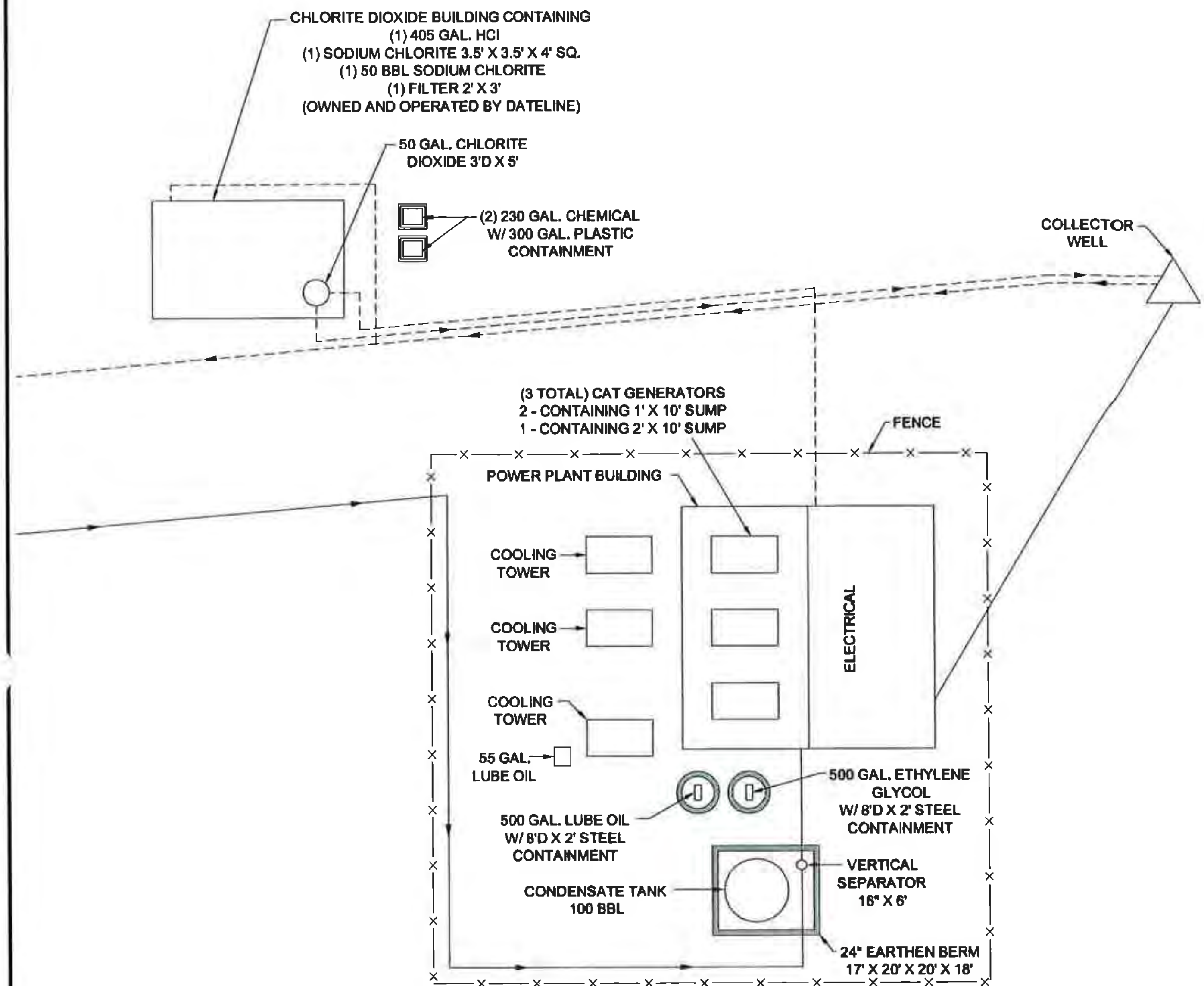


Average Water Column Height 54’

Tubing
SIZE/GRADE/WT.: 5-1/2” / J-55 / 15.5#
PUMP 1&3 TBG LENGTH 37’2”
PUMP 2 TBG LENGTH 32’3”
PUMP 4 TBG LENGTH 35’
NO. OF SUBS 1jt each
NO. OF X-OVER 1 each 5 ½” X 6”
X-OVER LENTGH 1’1”
SHROUD LEGNTH 48’
SHROUD SUB LEGNTH 5’8”
TBG SUBS FOR PUMP 1 thru 4 = 5’
TOTAL STRING LENGTH: 1&3= 84’7”
TOTAL STRING LENGTH: 2= 79’ 8”
Total string Length #4 = 82’ 6”

Pumps
280 HP 2800 Volt 60 Amp Motors
Weatherford 13 stage submersible
Pump length 9’4”
Seal section 8’1”
Motor length 30’

Laterals
Lateral Info 160’
5 Laterals 36 degrees on a 150 degree arc
12” x 10” muni-pack screen 150’



COLLECTOR WELL

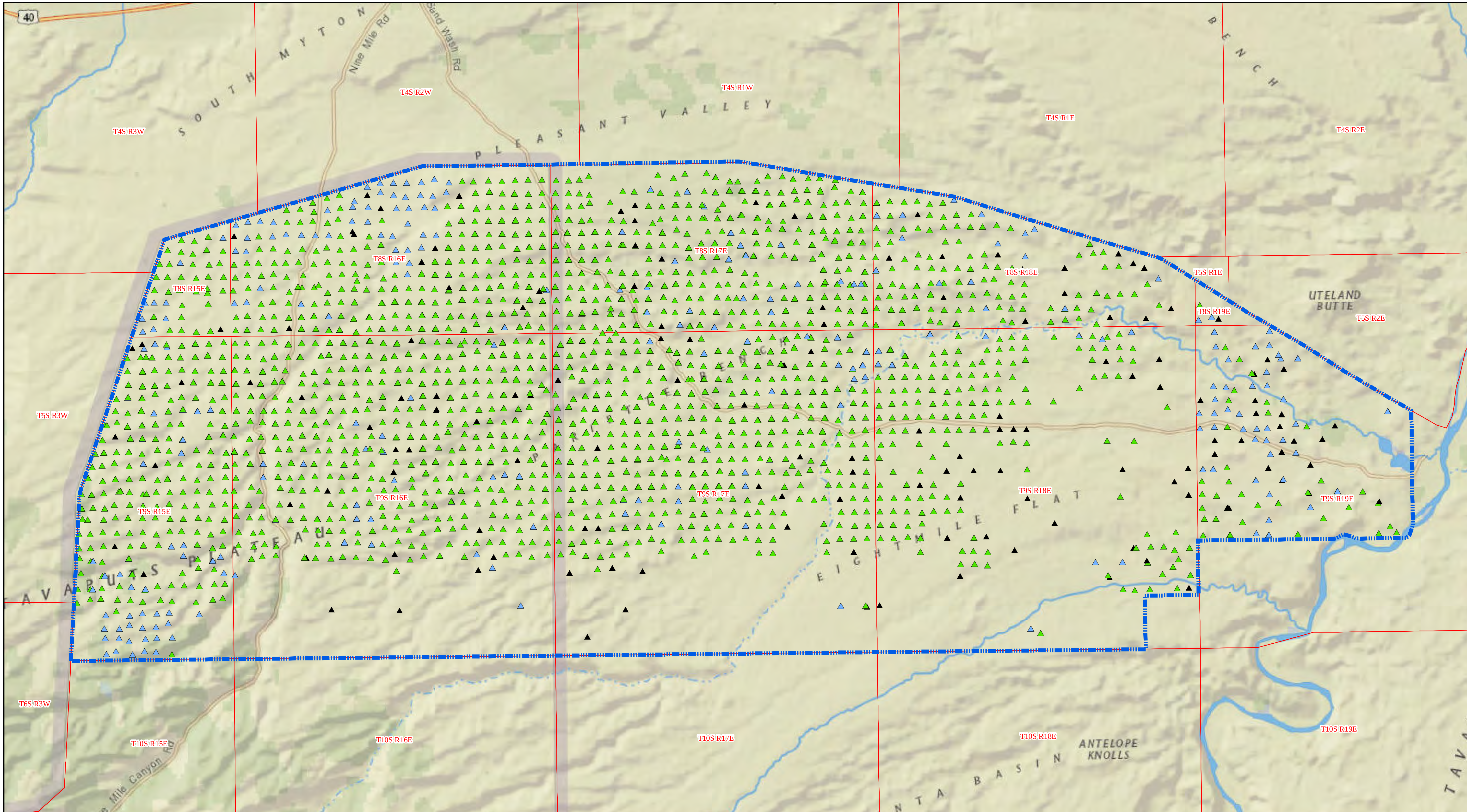
Newfield Exploration Company
SE1/4 Sec 22 and NE1/4 Sec 27, T9N, R19E
Uintah County, UT

N.T.S.

M.G.

APR 2013

KLEINFELDER
Bright People. Right Solutions.



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

Project Area Boundary

Active Wells
- DRL (122)
- P (1324)
- S (113)
- A (1014)

Inactive
- P (169)
- I (1)

Future
- NEW (13)
- APD (372)

Base Map: ESRI Online Map
Well Data: UDOGM (2013)

N W E S

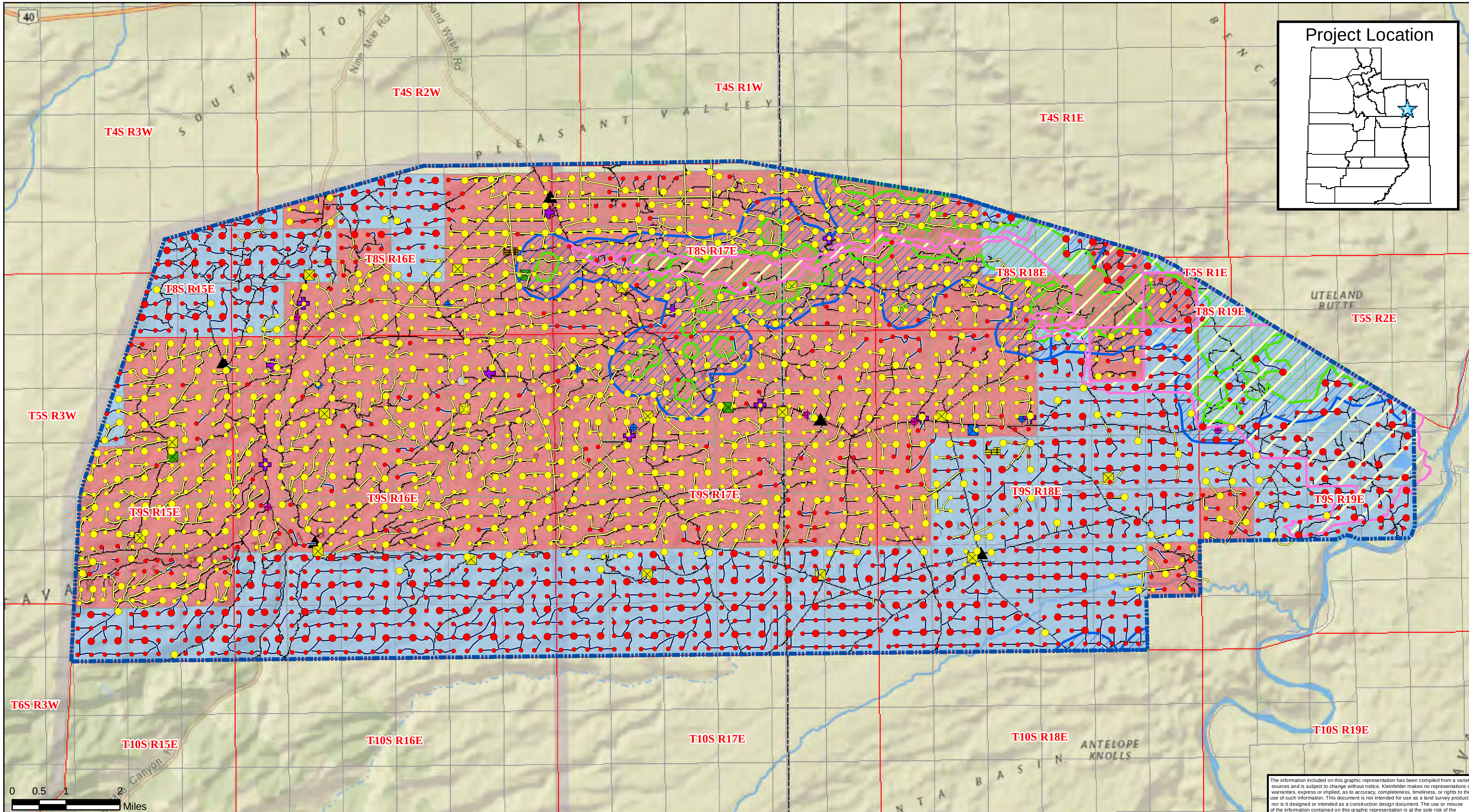
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/10/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	TarSands_OilShale_v2.mxd

Newfield Exploration Company
Monument Butte EIS

Active, Inactive, and Future Wells Within the MBPA

FIGURE
2.3-1



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

- Project Boundary
- ACEC Boundary
- Existing Well Pad (Large)
- Existing Well Pad (Small)
- Proposed Well Pad (Large)
- Proposed Well Pad (Small)
- Existing Central Tank Battery
- Proposed Deep Gas Compressor Station
- Existing Green River Compressor Station
- Proposed Green River Compressor Station
- Proposed Pump Station
- Existing Gas Processing Plant
- Proposed Gas Processing Plant
- Existing Water Injection Facility
- Proposed Water Injection Facility
- County Boundary
- Proposed GOSP
- Existing ROWs (Alt D)
- Conceptual ROWs (Alt D)
- High Well Density Area
- Low Well Density Area

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	10/17/2014
DRAWN BY:	A.Leonard
CHECKED BY:	D.Martin
FILE NAME:	Fig 2.6-1_v2.mxd

Monument Butte EIS

Newfield Production Company
High- and Low-Density Development Areas
Under Alternative D

FIGURE
2.6-1

0 250 500 1,000 Feet

Legend

- Large Well Pad
- Small Well Pad
- 20-ac Directional Oil Well
- Directional Deep Gas Well
- Section

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	3/30/2015
DRAWN BY:	A.Leonard
CHECKED BY:	D.Martin
FILE NAME:	Figure 2.6-2.mxd

Monument Butte EIS

Newfield Production Company
Low-Density Development
Scenario for Alternative D

FIGURE
2.6-2

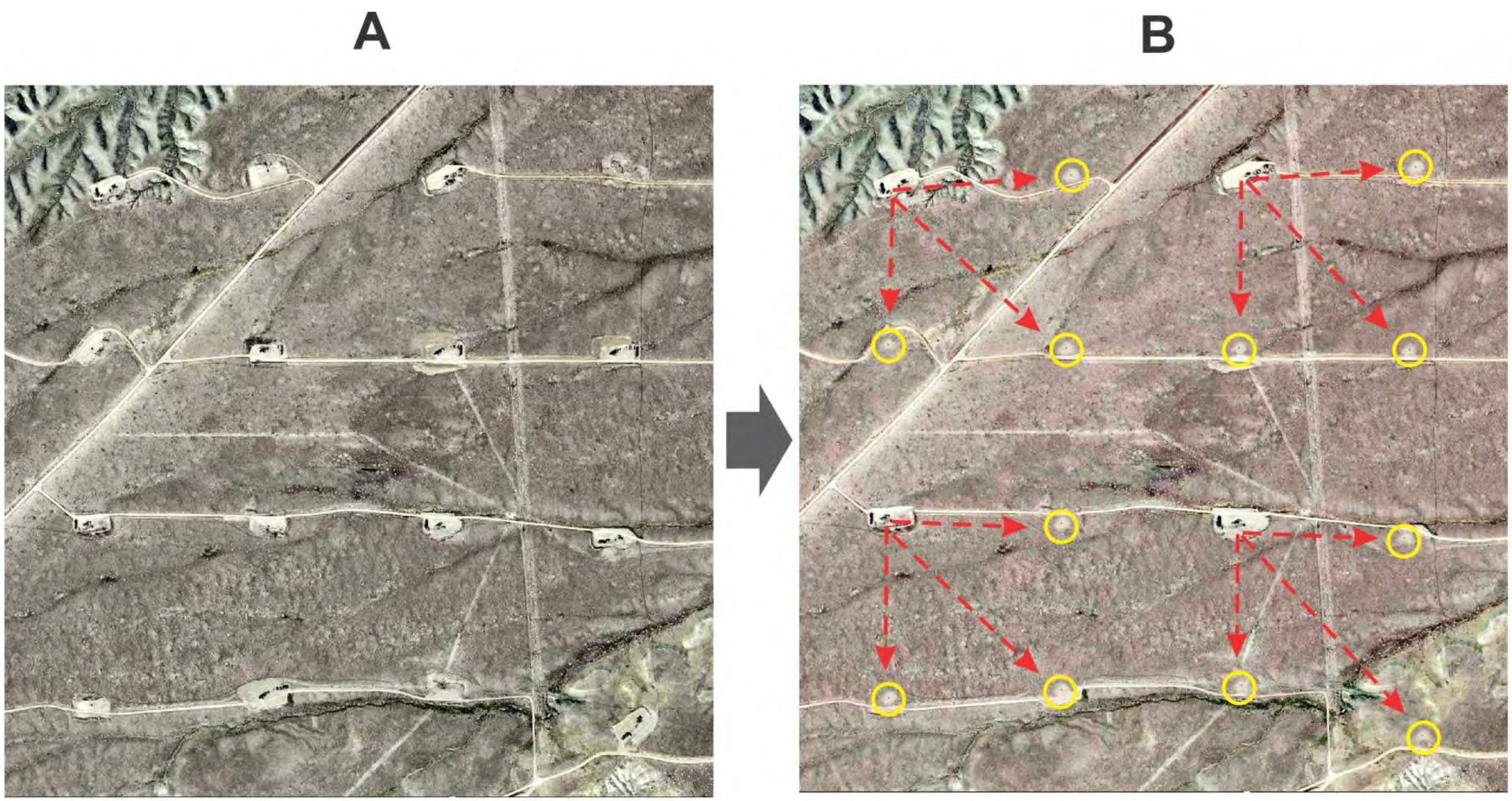
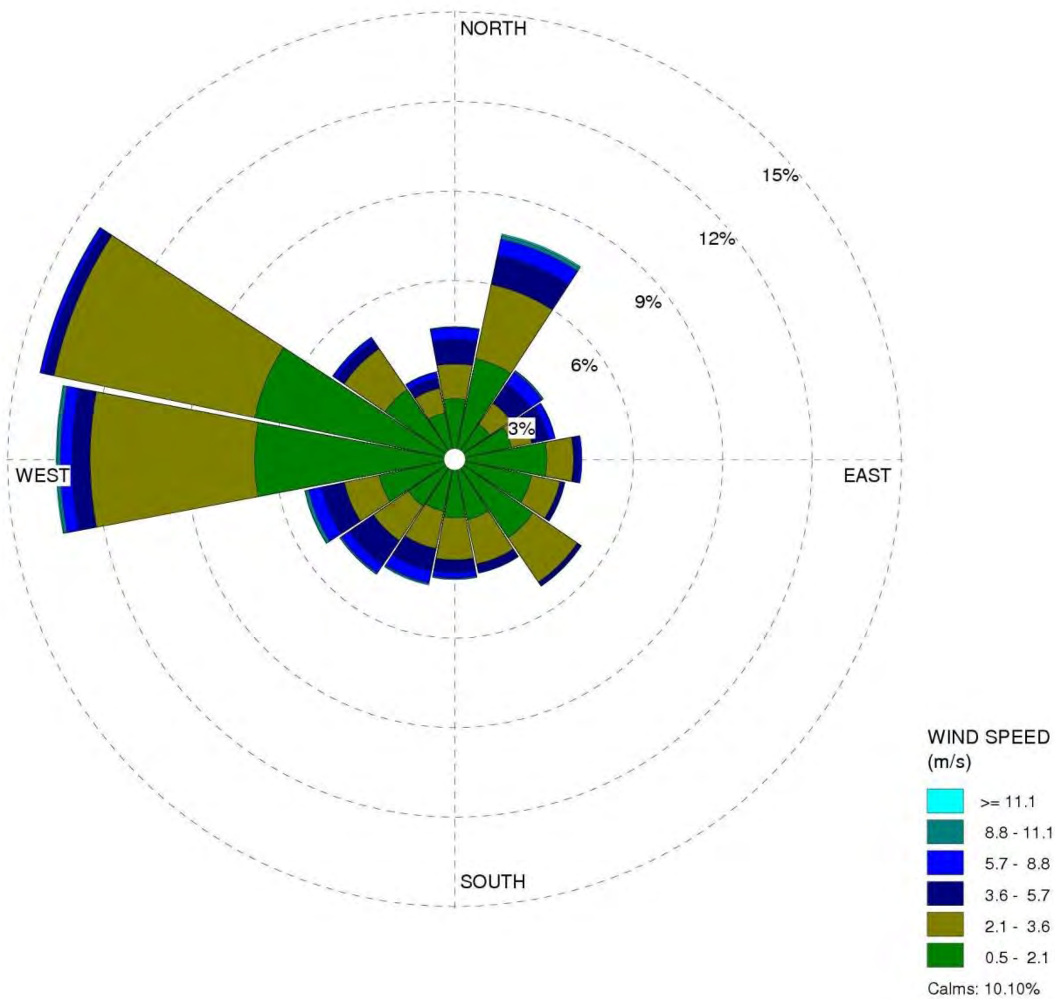
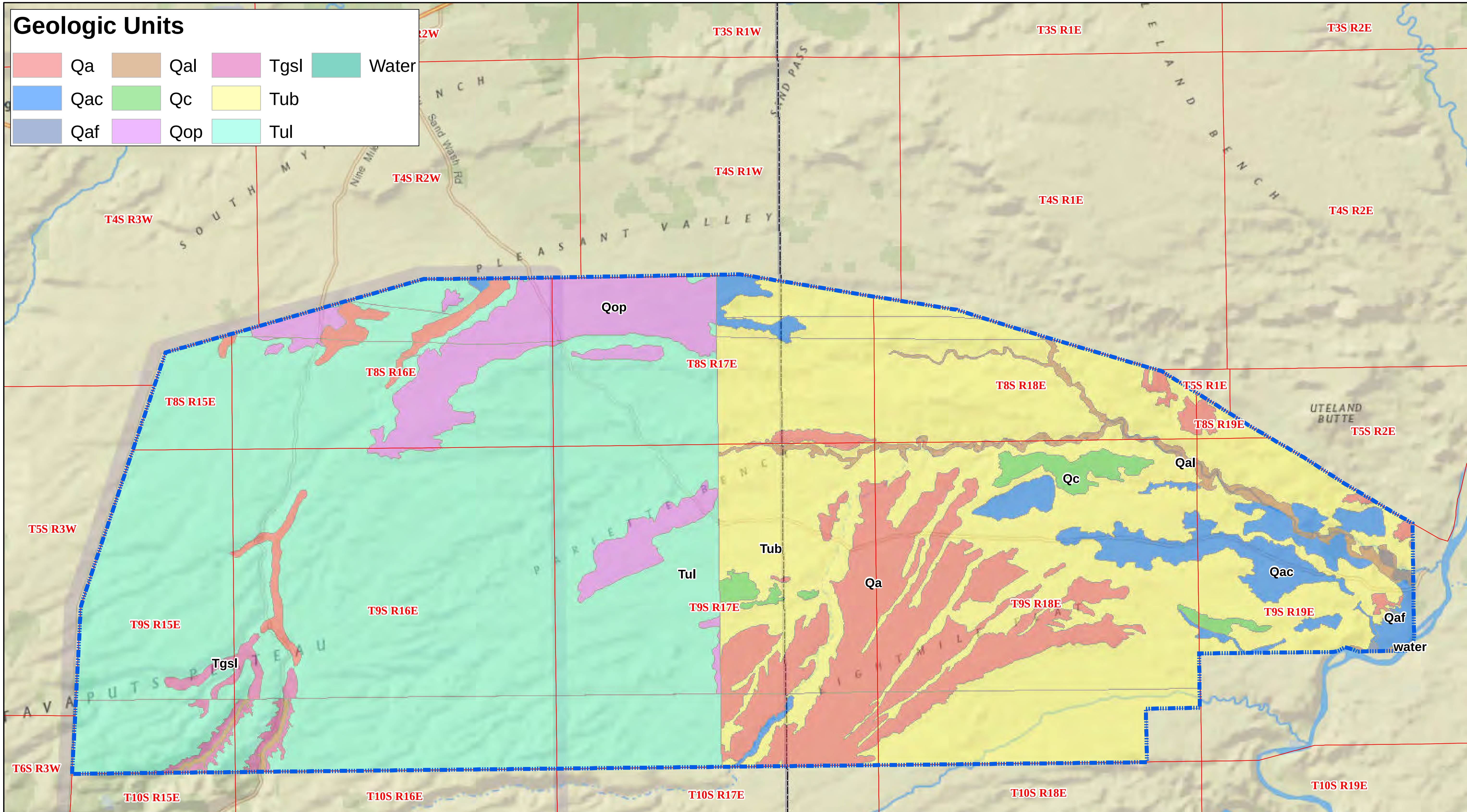


Figure 2.6-2. Comparison of a Typical 640-acre Section Drilled at a 40-acre Surface Spacing (16 Well Pads) (A), with Simulations of Four of the Well Pads Expanded for Directional Drilling, and the Conversion of the Remaining 12 Well Pads Into Water-flood Injection Wells as Shown in Yellow (B).

Figure 3.2.1.2-1. Wind Rose from Vernal Data 2005-2009





0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

Project Area Boundary

Base Map: ESRI Online Map
Geology Data: Utah Geological Survey (2000)

N E S W

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

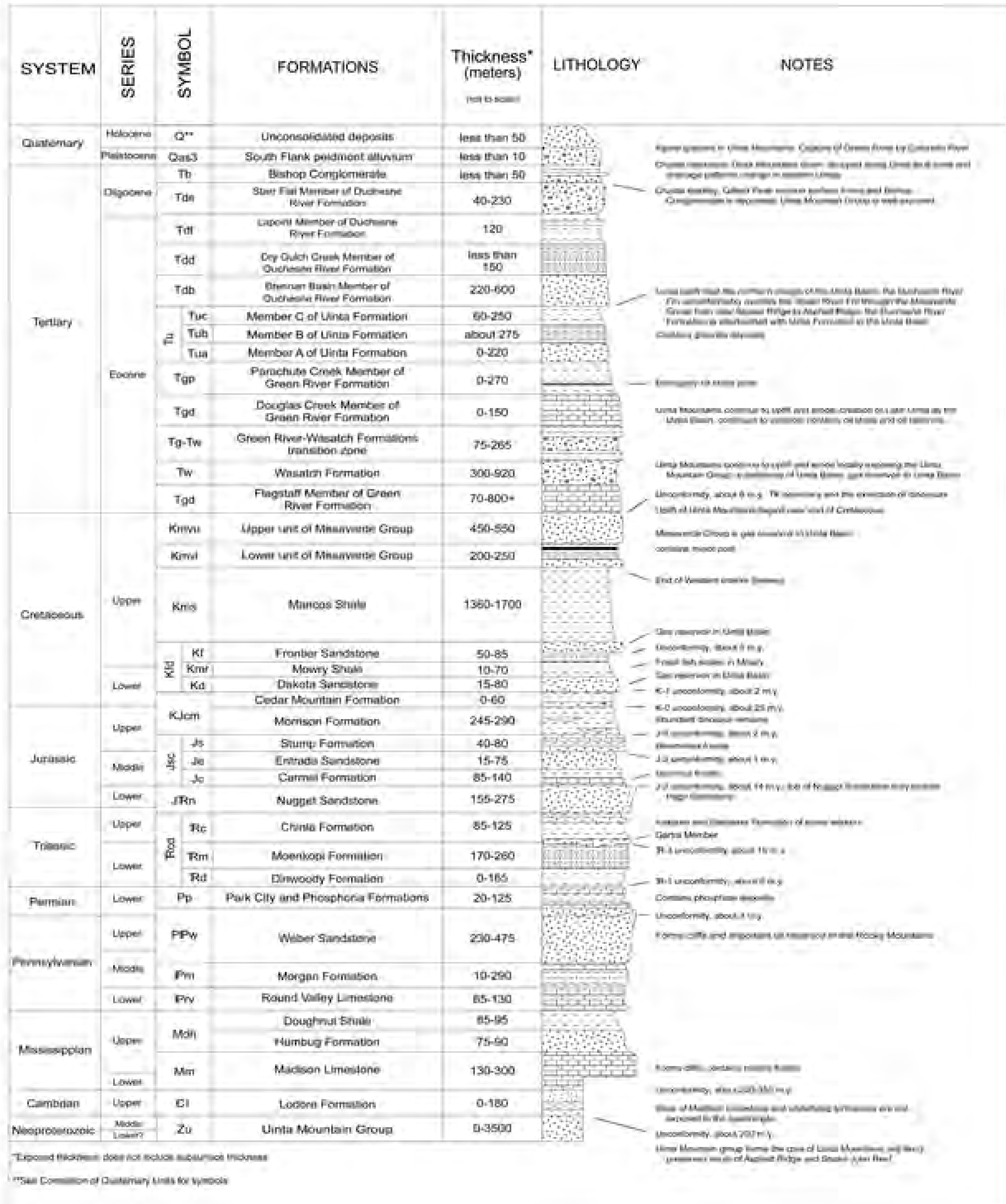
PROJECT NO.	116133
DRAWN:	9/12/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	SurficialGeology.mxd

Newfield Exploration Company
Monument Butte EIS

Surficial Geology
Uintah & Duchesne Counties, Utah

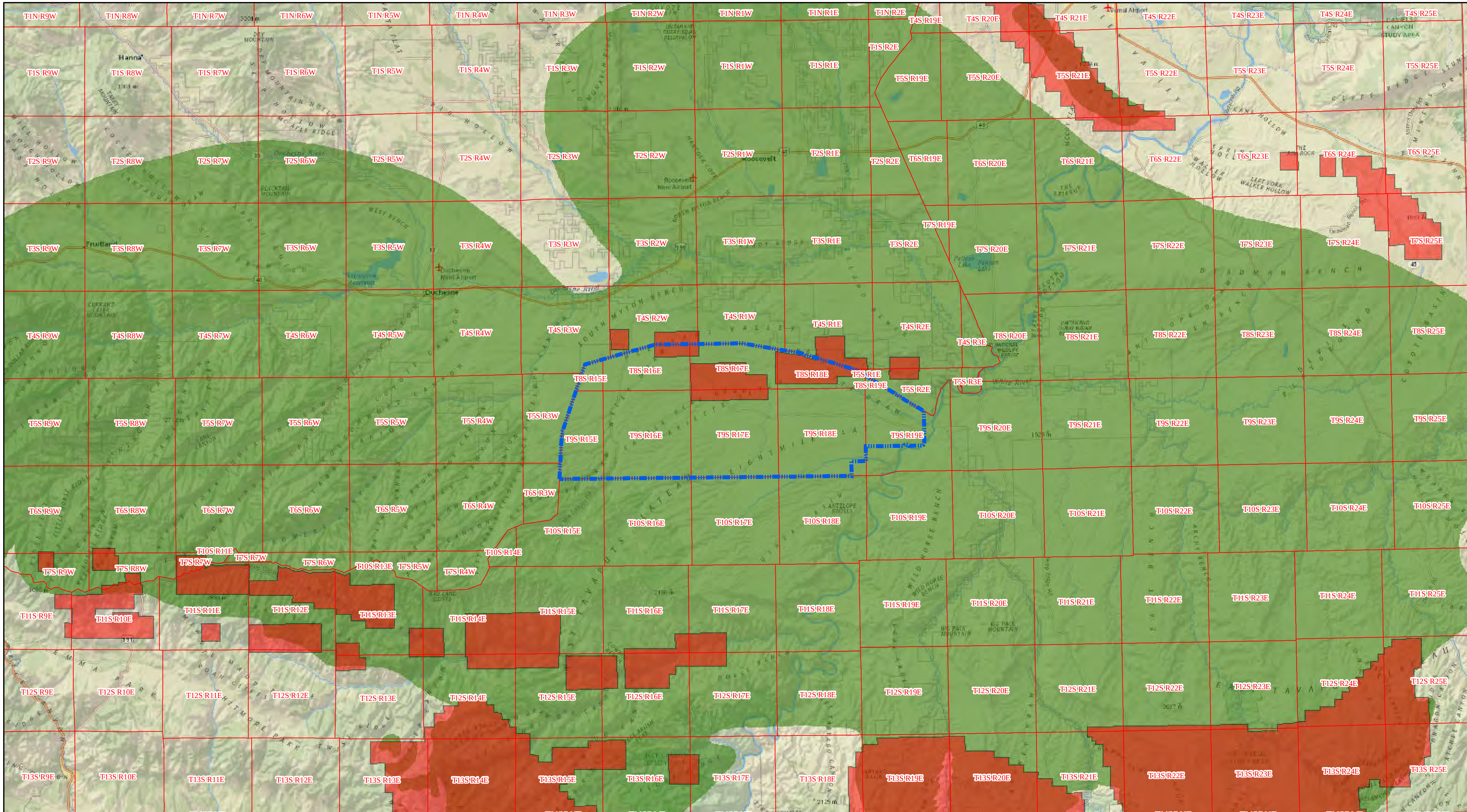
FIGURE
3.3.1-1

Figure 3.3.1-2. Geographic History and Stratigraphy of the Uinta Basin Region



Source: Sprinkel 2007

Figure 3.3.4.1-1. Oil and Gas Fields and Potential Mineral Areas within the Uinta Basin



0 2.5 5 10
Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

- Project Area Boundary
- Special Tar Sands Area (STSAs)
- Known Oil Shale Lease Area (KOSLAs)

Base Map: ESRI Online Map
Tar Sands and Oil Shale Data:
Utah SGID ArcSDE Database (2012)

N E S W

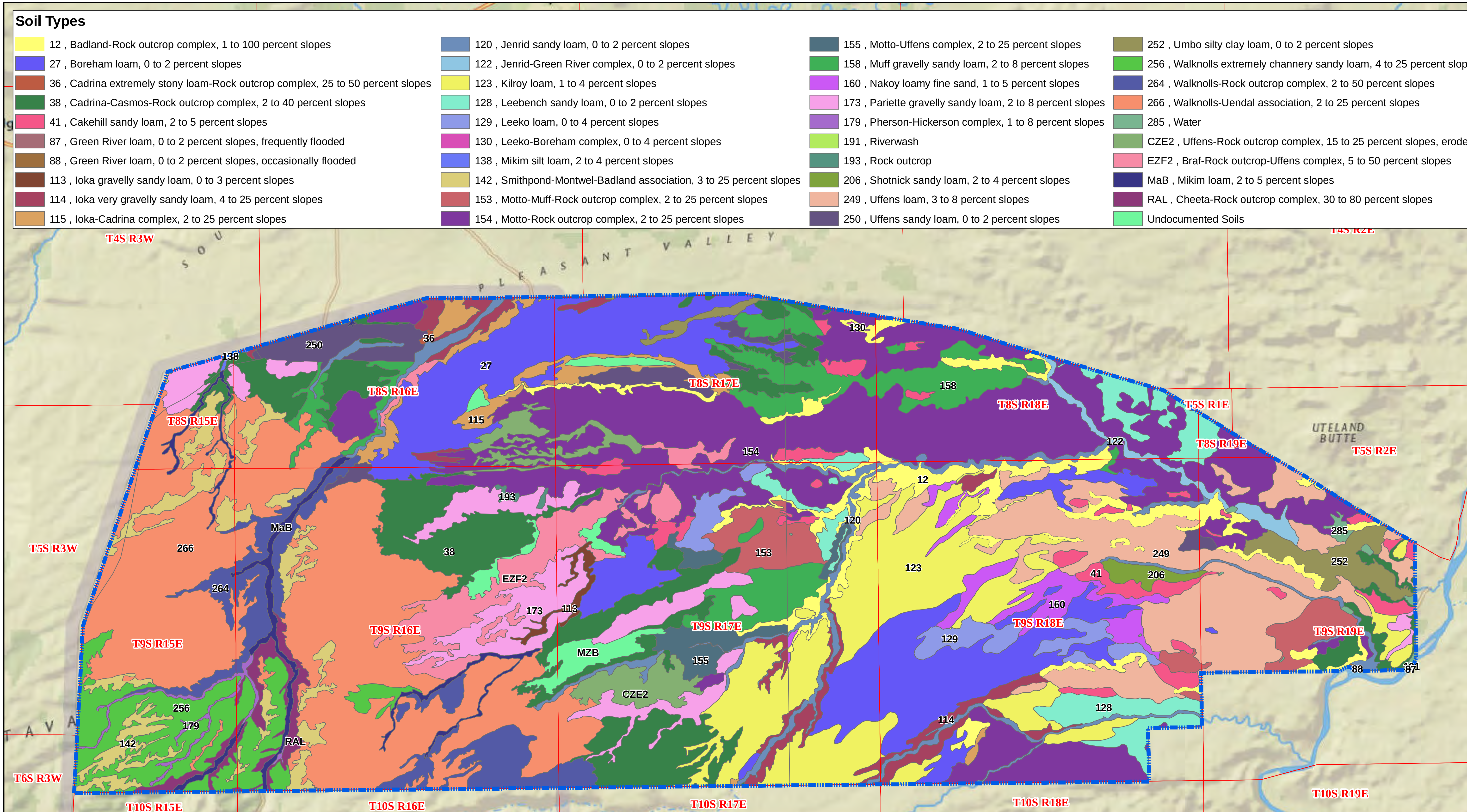
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/10/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	TarSands_OilShale_v2.mxd

Newfield Exploration Company
Monument Butte EIS

Special Tar Sands and
Known Oil Shale Areas
In the Vicinity of the MBPA

FIGURE
3.3.4.1-2



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

Project Area Boundary

Base Map: ESRI Online Map
Soil Data: NRCS 2003 and 2012c

N W E S

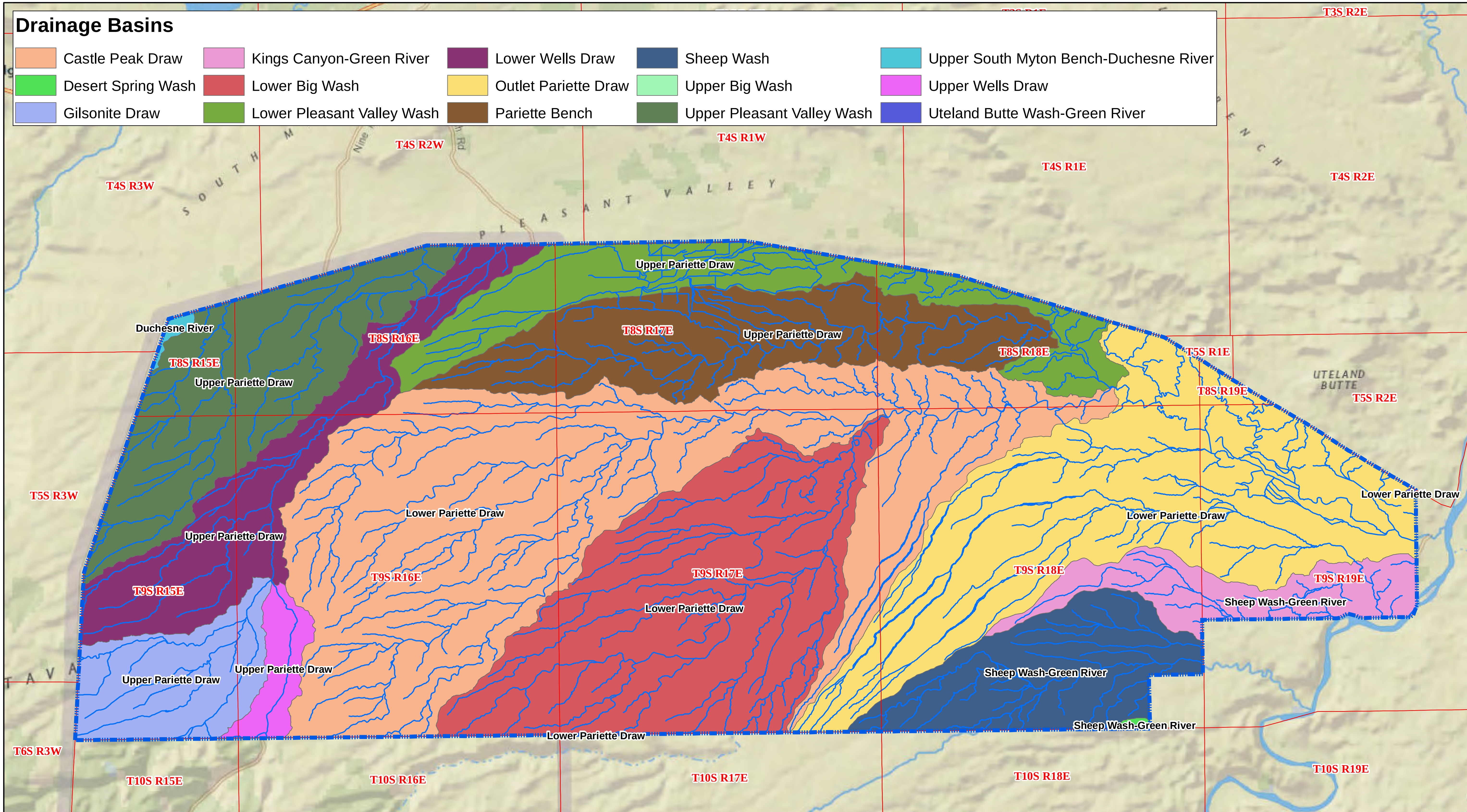
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/10/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	ProjectAreaSoils.mxd

Newfield Exploration Company
Monument Butte EIS

Soil Map Units
Within the MBPA

FIGURE
3.5-1



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

Project Area Boundary

Rivers/Streams

Base Map: ESRI Online Map
Drainage Basin Data: Utah SGID ArcSDE Database (2003)
Stream Data: Utah SGID ArcSDE Database (2011)

N W E S

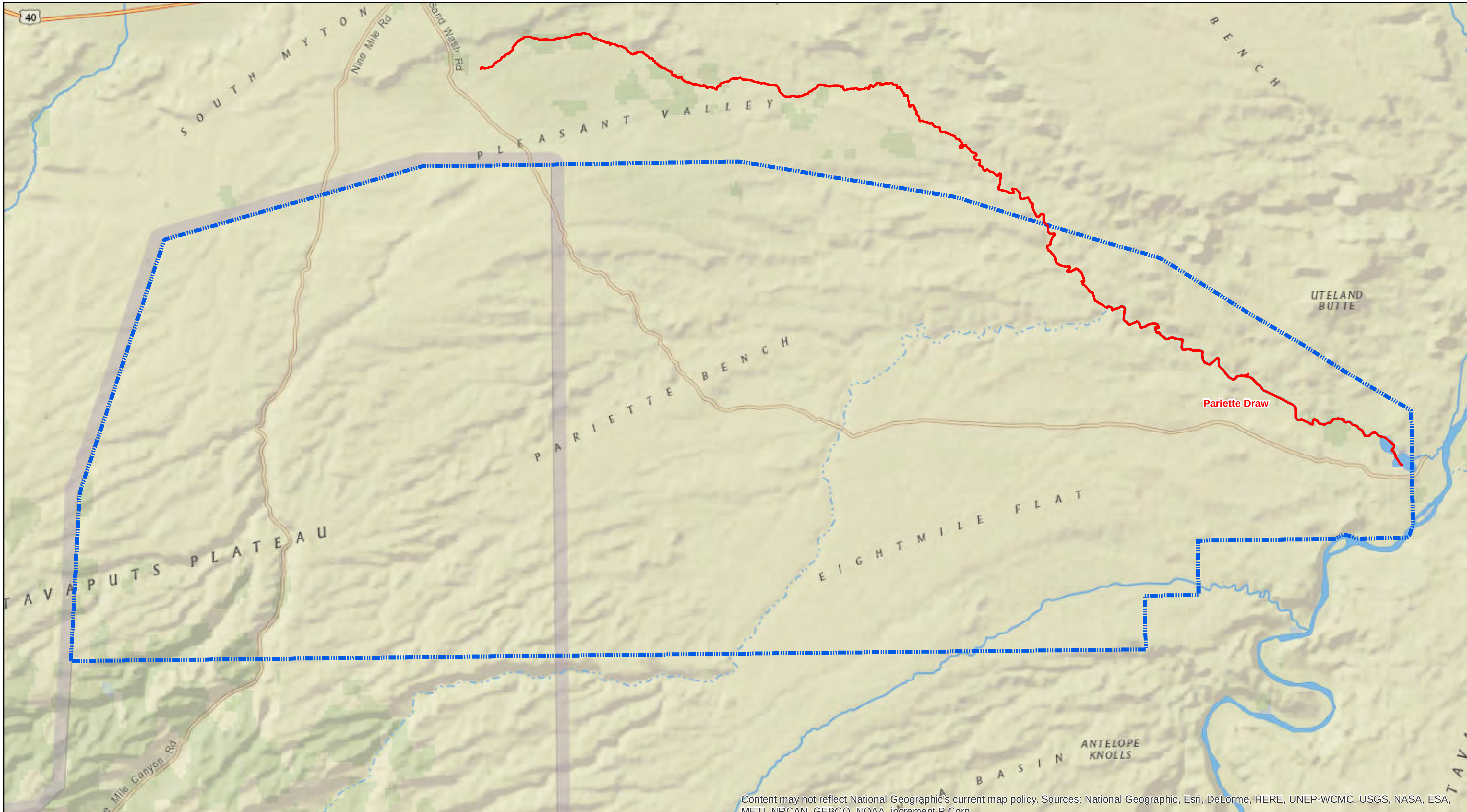
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	10/8/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	Drainage Basins.mxd

Newfield Exploration Company
Monument Butte EIS

Drainage Basins
Within the MBPA

FIGURE
3.6.2.1-1



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

- Impaired Streams
- Project Area Boundary

Base Map: ESRI Online Map
Impaired Stream Data: EPA (2002)

N W E S

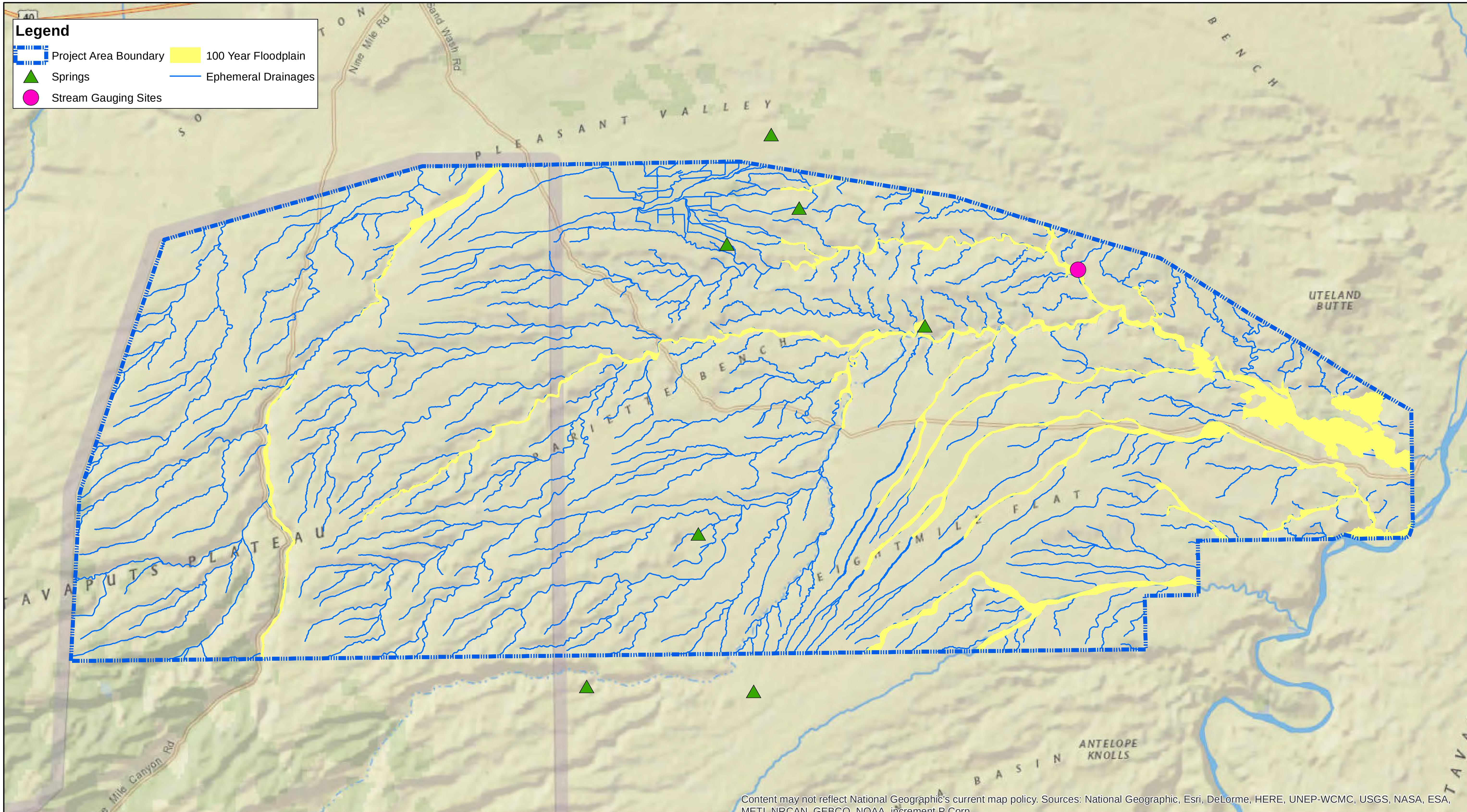
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	11/25/2014
DRAWN BY:	A.Leonard
CHECKED BY:	D.Martin
FILE NAME:	ImpairedWaters.mxd

Newfield Exploration Company
Monument Butte EIS

Impaired Streams
In the Vicinity of the MBPA

FIGURE
3.6.2.3-1



0 1.25 2.5 5
Miles

N W E S

Base Map: ESRI Online Map
Floodplain Data: Utah SGID ArcSDE Database (1995)
Stream Data: Utah SGID ArcSDE Database (2011)
Stream Guage Data: USGS (2004)
Springs Data: Utah SGID ArcSDE Database (2011)

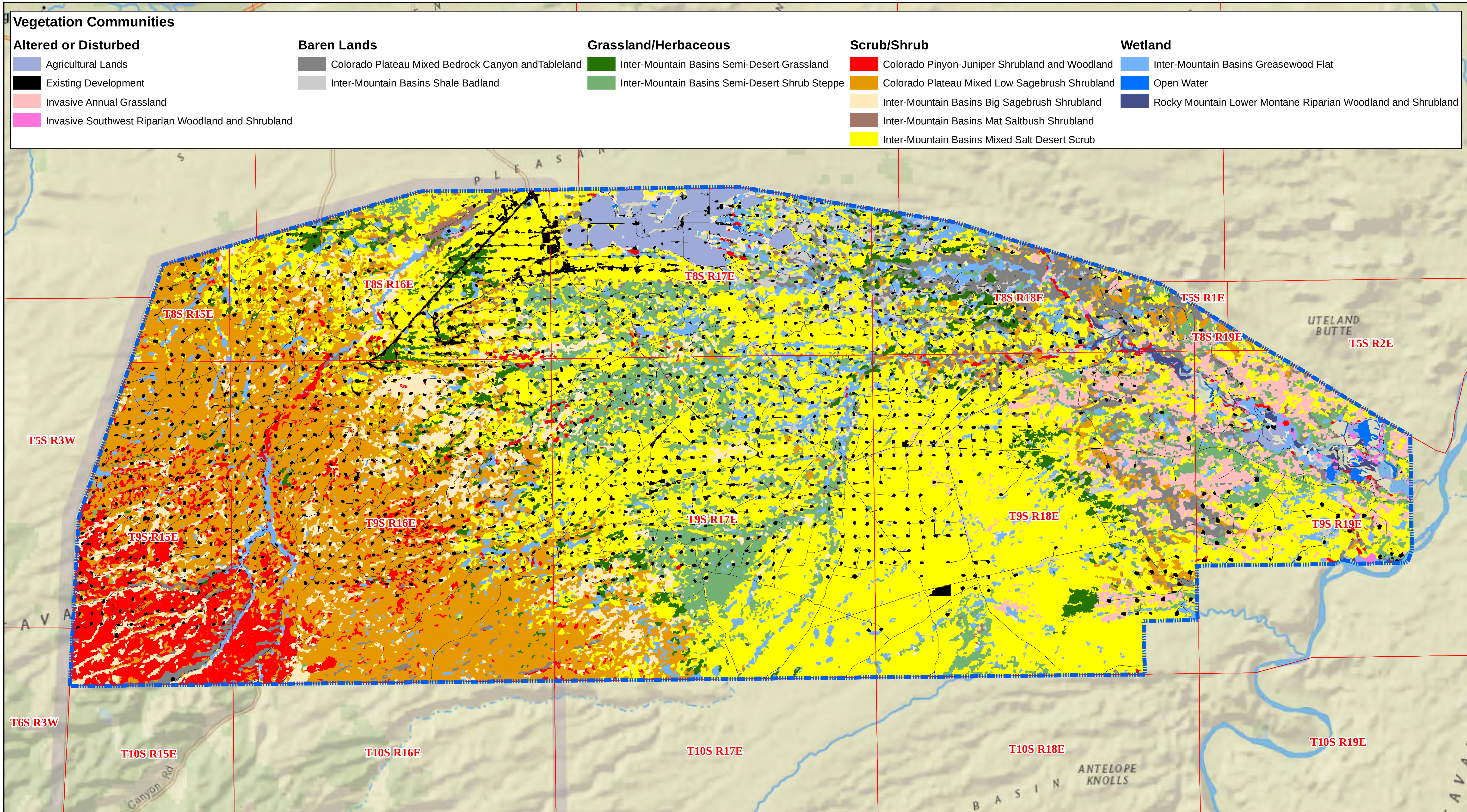
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	3/27/2015
DRAWN BY:	A.Leonard
CHECKED BY:	D.Martin
FILE NAME:	Floodplain.mxd

Newfield Exploration Company
Monument Butte EIS

Surface Water and Floodplains
Uintah & Duchesne Counties, Utah

FIGURE
3.6.3.2-1



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

Project Area Boundary

Base Map: ESRI Online Map
Vegetation Data: SWReGAP (2005)

N W E S

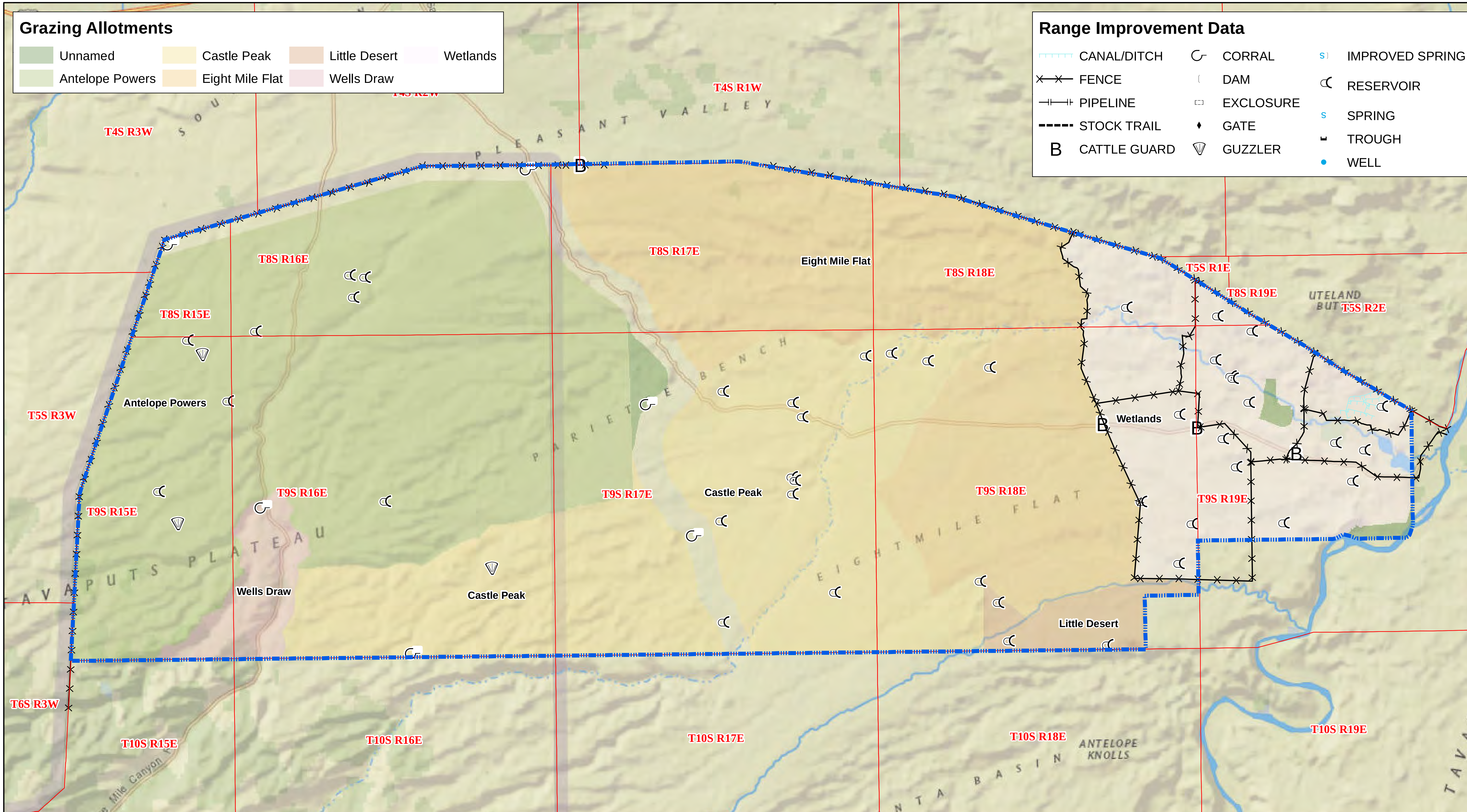
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/6/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	Vegetation.mxd

Newfield Exploration Company
Monument Butte EIS

Vegetation Communities
Within the MBPA

FIGURE
3.7.1-1



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

Project Area Boundary

N W E S

Base Map: ESRI Online Map
Grazing Allotment Data:
Bureau of Land Management RMP (2011)

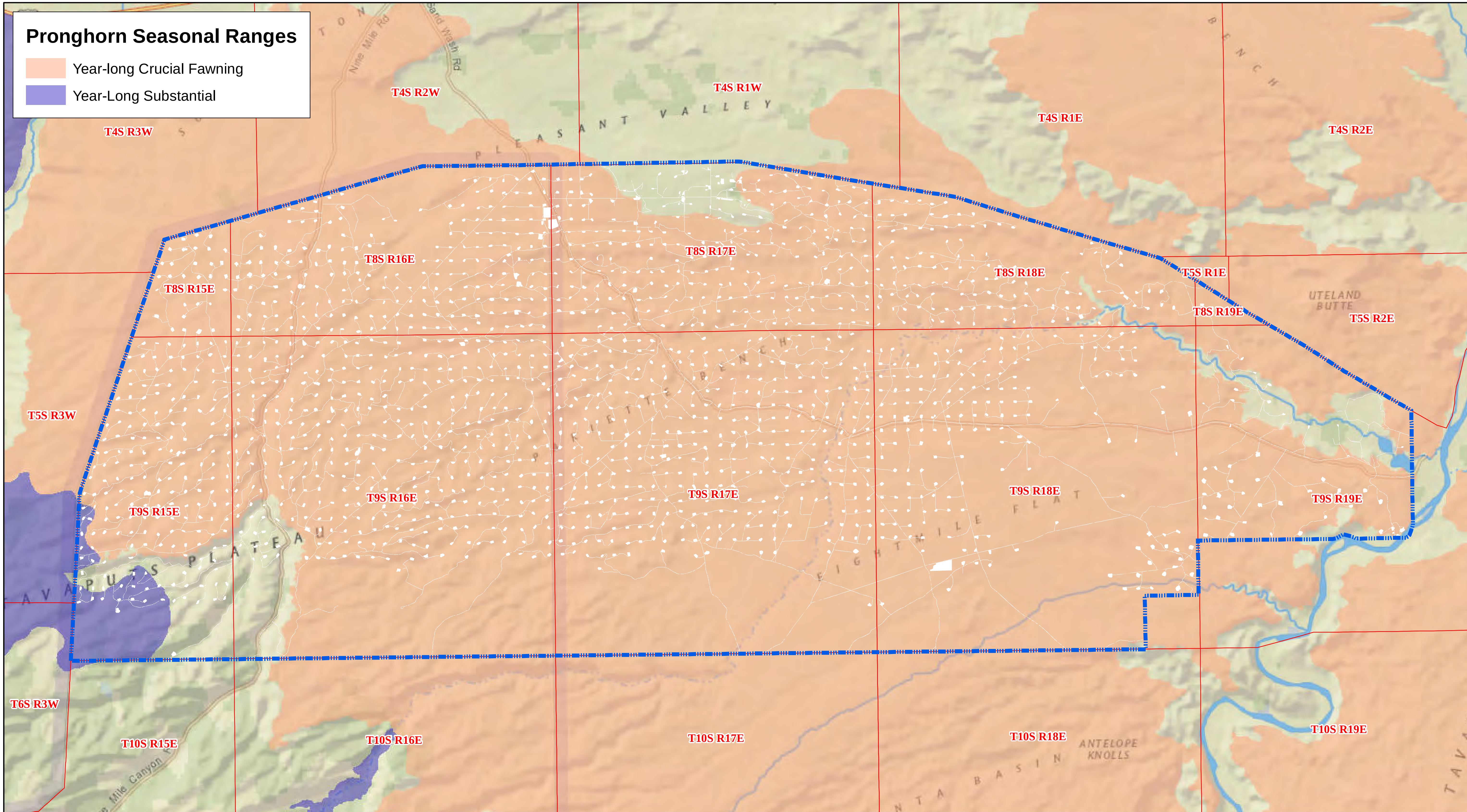
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/6/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	GrazingAllotments_v4.mxd

Newfield Exploration Company
Monument Butte EIS

Grazing Allotments
Within the MBPA

FIGURE
3.8.2-1



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

Project Area Boundary

Existing Well Pads and Roads

Base Map: ESRI Online Map
Pronghorn Data: UDWR (2010)

N W E S

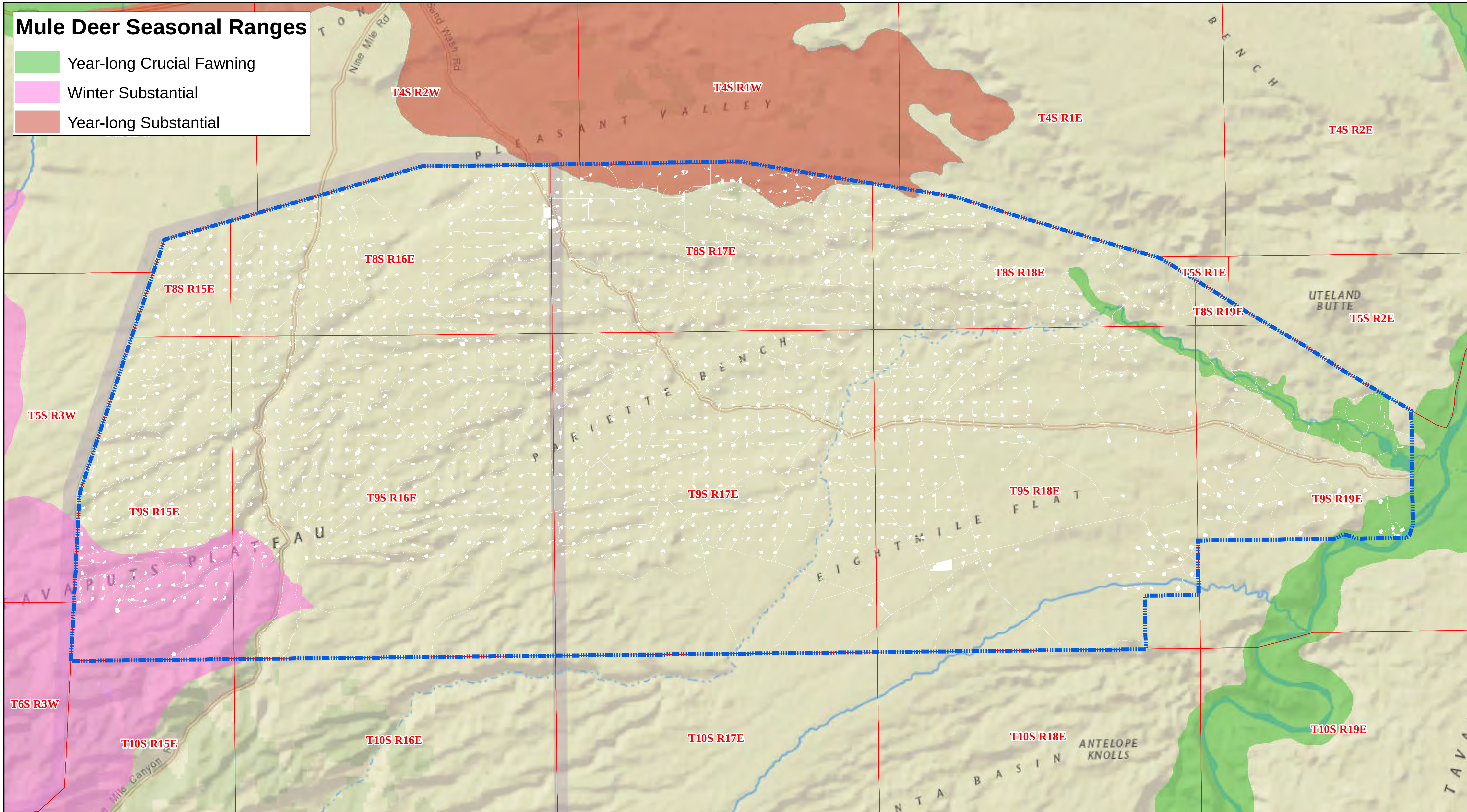
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/6/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	Pronghorn.mxd

Newfield Exploration Company
Monument Butte EIS

Pronhorn Antelope Seasonal Ranges
Within the MBPA

FIGURE
3.9.3.1-1



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

- Project Area Boundary
- Existing Well Pads and Roads

Base Map: ESRI Online Map
Mule Deer Data: UDWR (2012)

N W E S

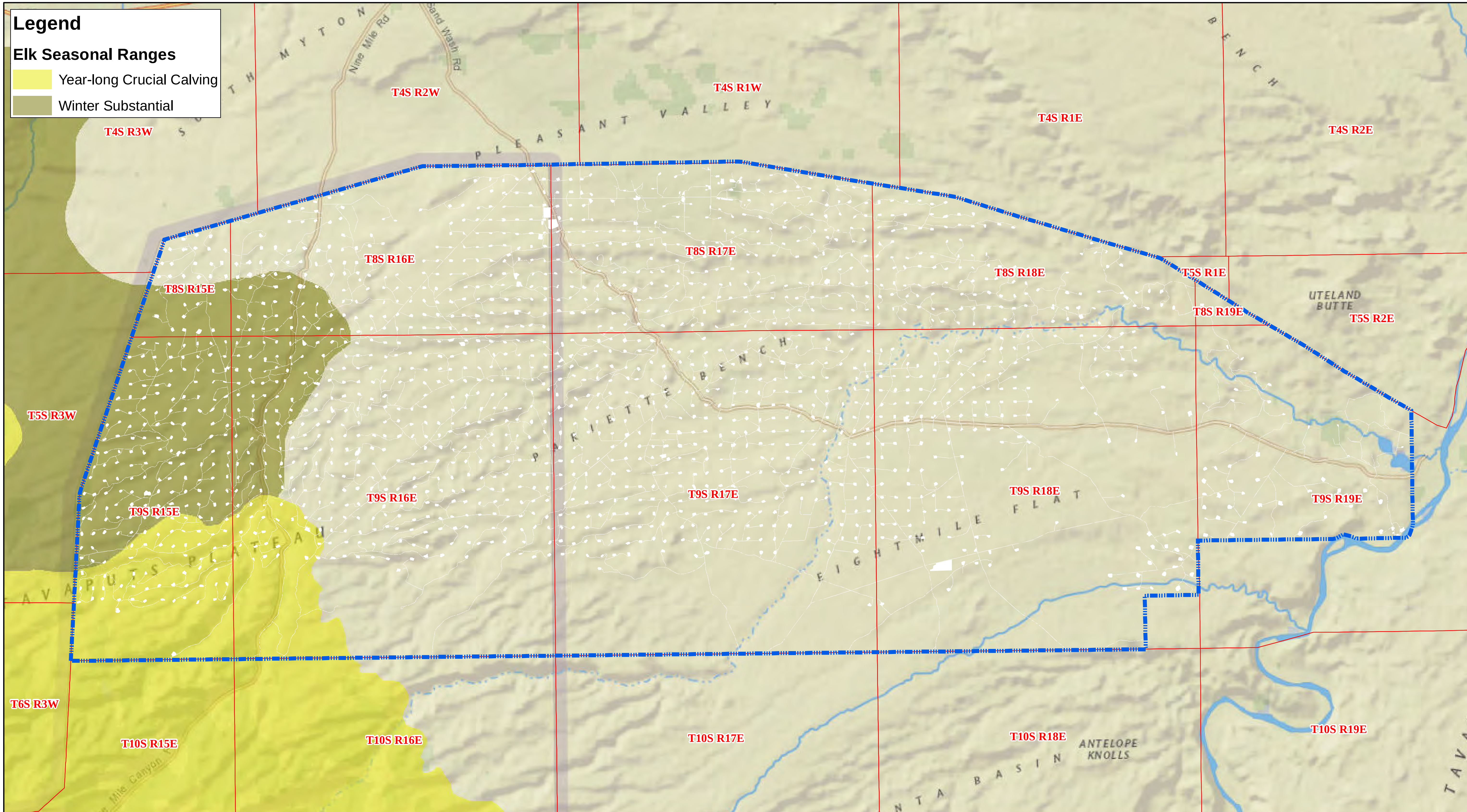
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/6/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	MuleDeer.mxd

Newfield Exploration Company
Monument Butte EIS

Mule Deer Seasonal Ranges
Within the MBPA

FIGURE
3.9.3.2-1



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

Project Area Boundary

Existing Well Pads and Roads

Base Map: ESRI Online Map
Elk and Sheep Data: UDWR (2010)

N W E S

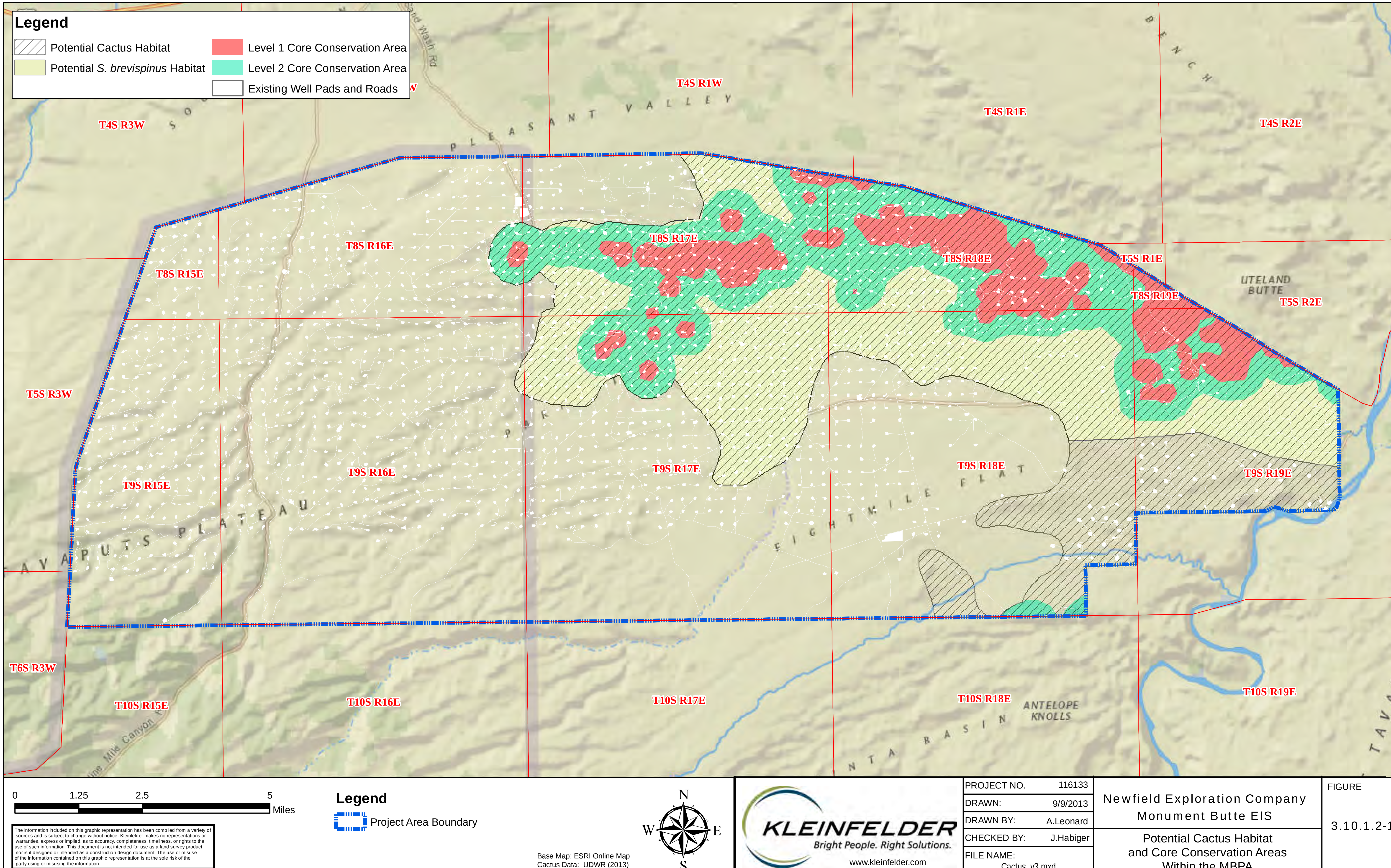
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/9/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	Elk.mxd

Newfield Exploration Company
Monument Butte EIS

Elk Seasonal Ranges
Within the MBPA

FIGURE
3.9.3.3-1



Base Map: ESRI Online Map
Cactus Data: UDWR (2013)

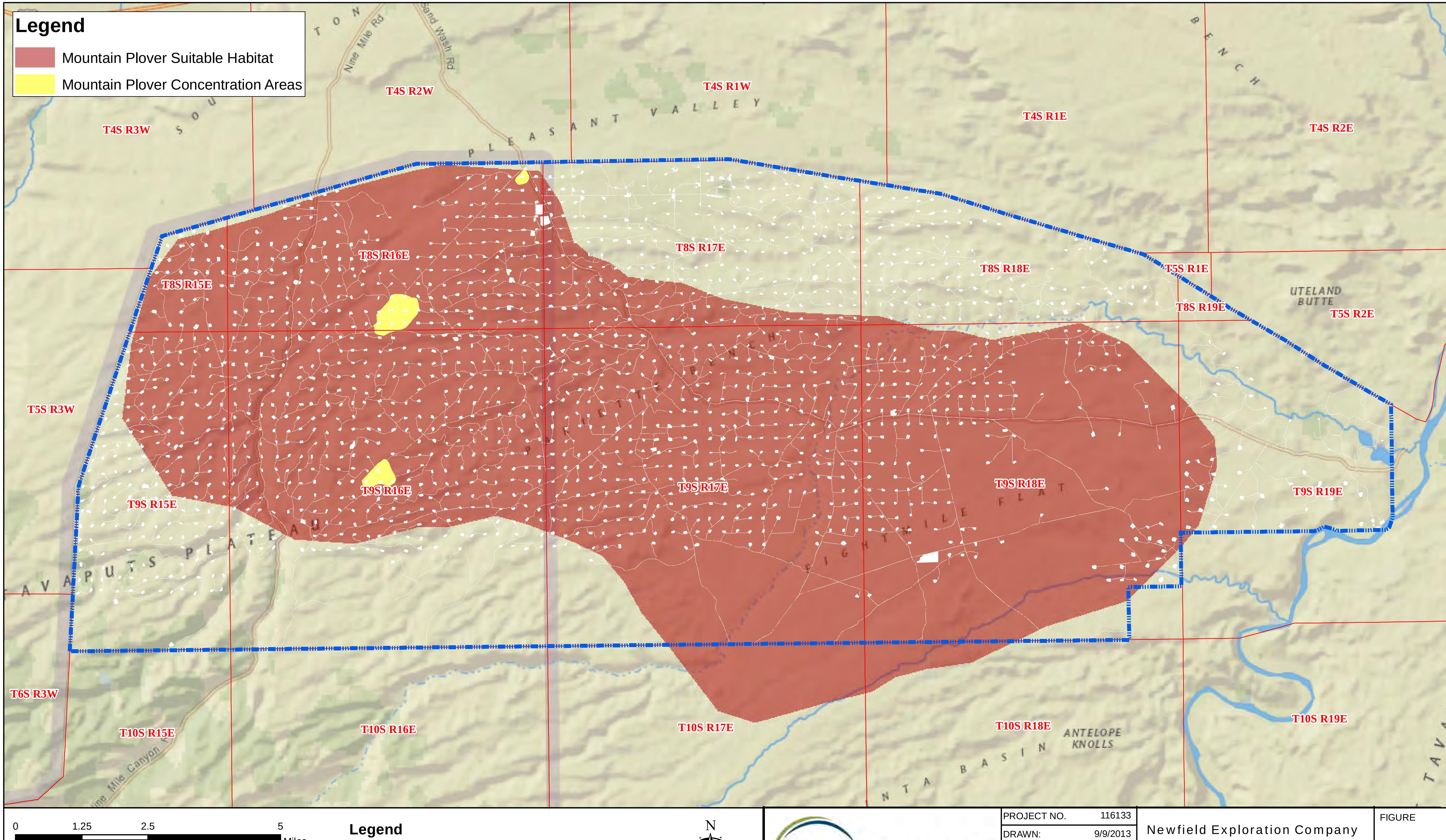
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/9/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	Cactus_v3.mxd

Newfield Exploration Company
Monument Butte EIS

Potential Cactus Habitat
and Core Conservation Areas
Within the MBPA

FIGURE
3.10.1.2-1



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

Project Area Boundary

Existing Well Pads and Roads

Base Map: ESRI Online Map
Plover Data: UDWR (2010)

N W E S

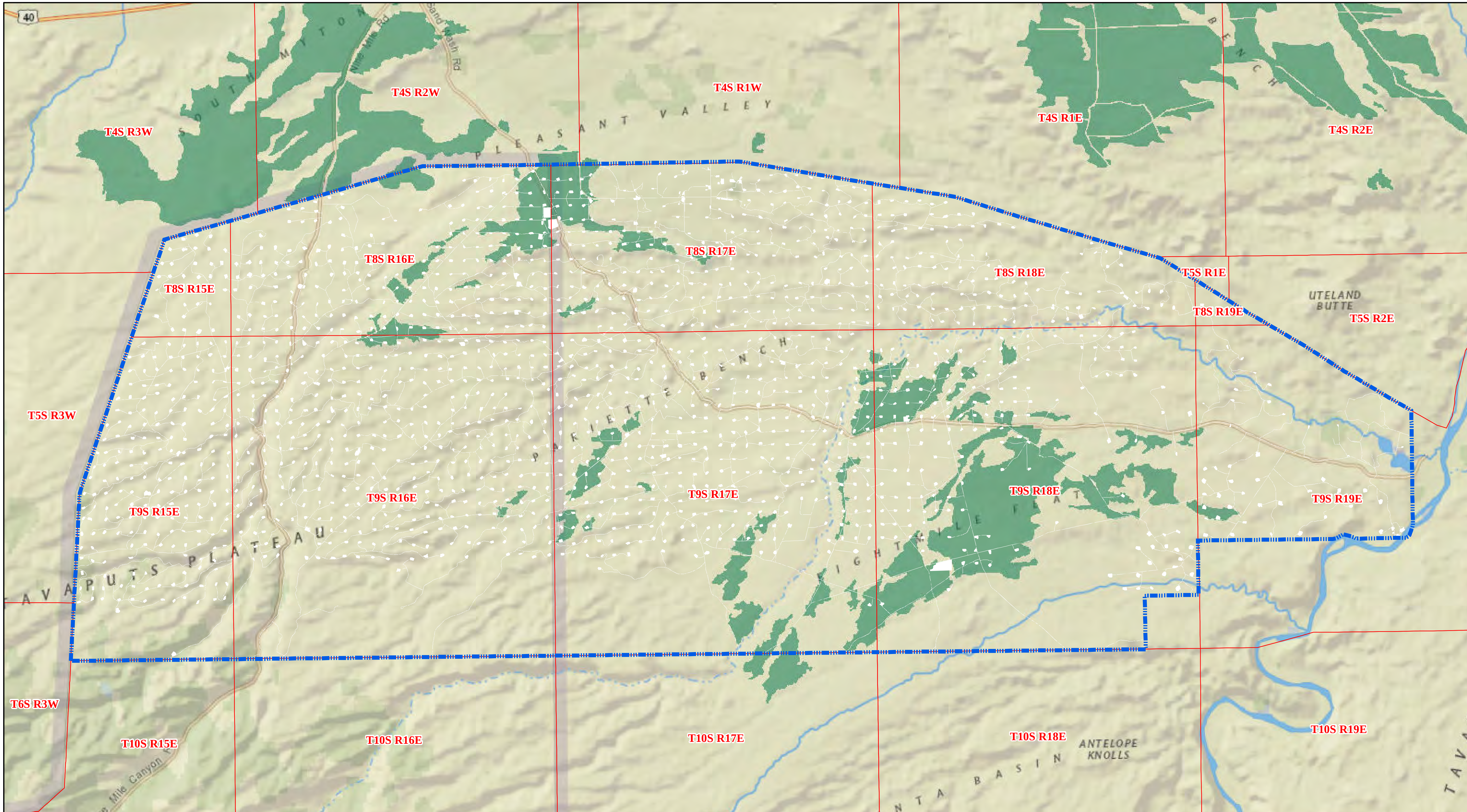
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/9/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	Plover_v3.mxd

Newfield Exploration Company
Monument Butte EIS

Mountain Plover Habitat
Within the MBPA

FIGURE
3.10.2.1.12-1



0 1.25 2.5 5 Miles

Legend

- Project Area Boundary
- Existing Well Pads and Roads
- Prairie Dog Habitat Towns

Base Map: ESRI Online Map
Prarie Dog Data: UDWR (2010)

N W E S

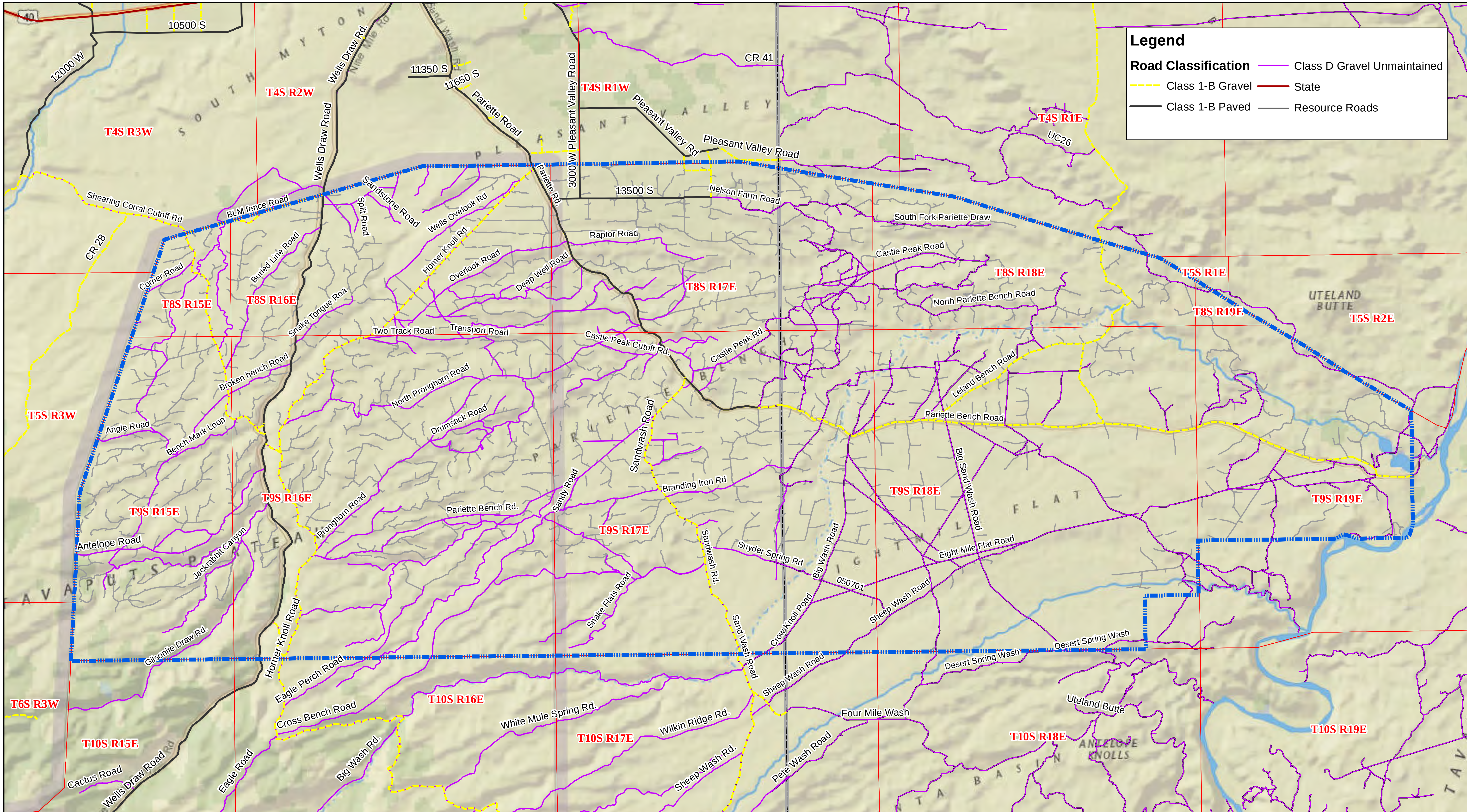
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/9/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	PrarieDog_v2.mxd

Newfield Exploration Company
Monument Butte EIS

Prairie Dog Colonies
Within the MBPA and Surrounding Region

FIGURE
3.10.2.1.4-1



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

Project Area Boundary

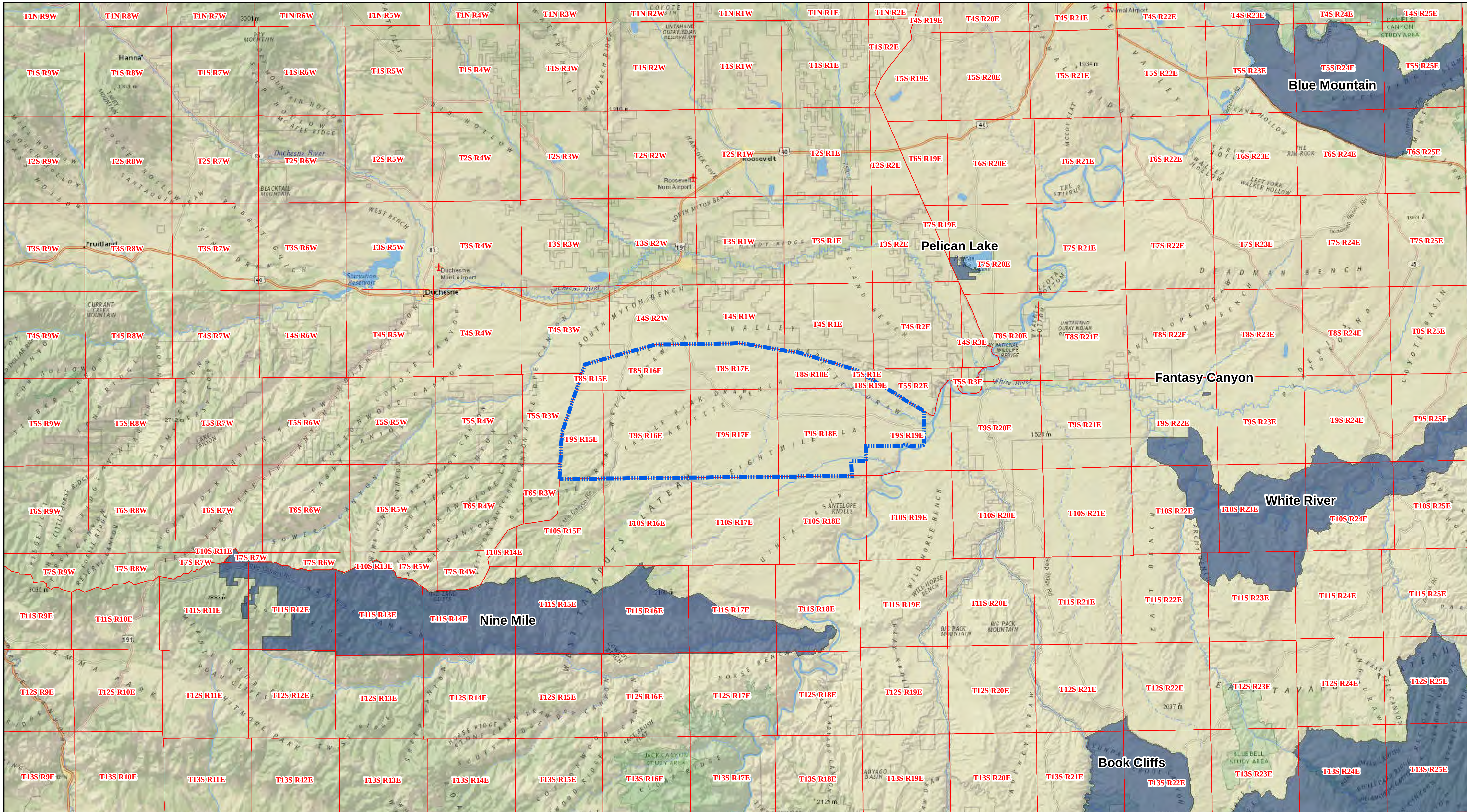
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/9/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	MBPA_RoadwaySystem_3.mxd

Newfield Exploration Company
Monument Butte EIS

MBPA Roadway System
Within the MBPA

FIGURE
3.12.2-1



0 2.5 5 10 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

- Project Area Boundary
- Special Recreation Management Area (SRMA)

Base Map: ESRI Online Map
SRMA Data: Bureau of Land Management RMP (2010)

N W E S

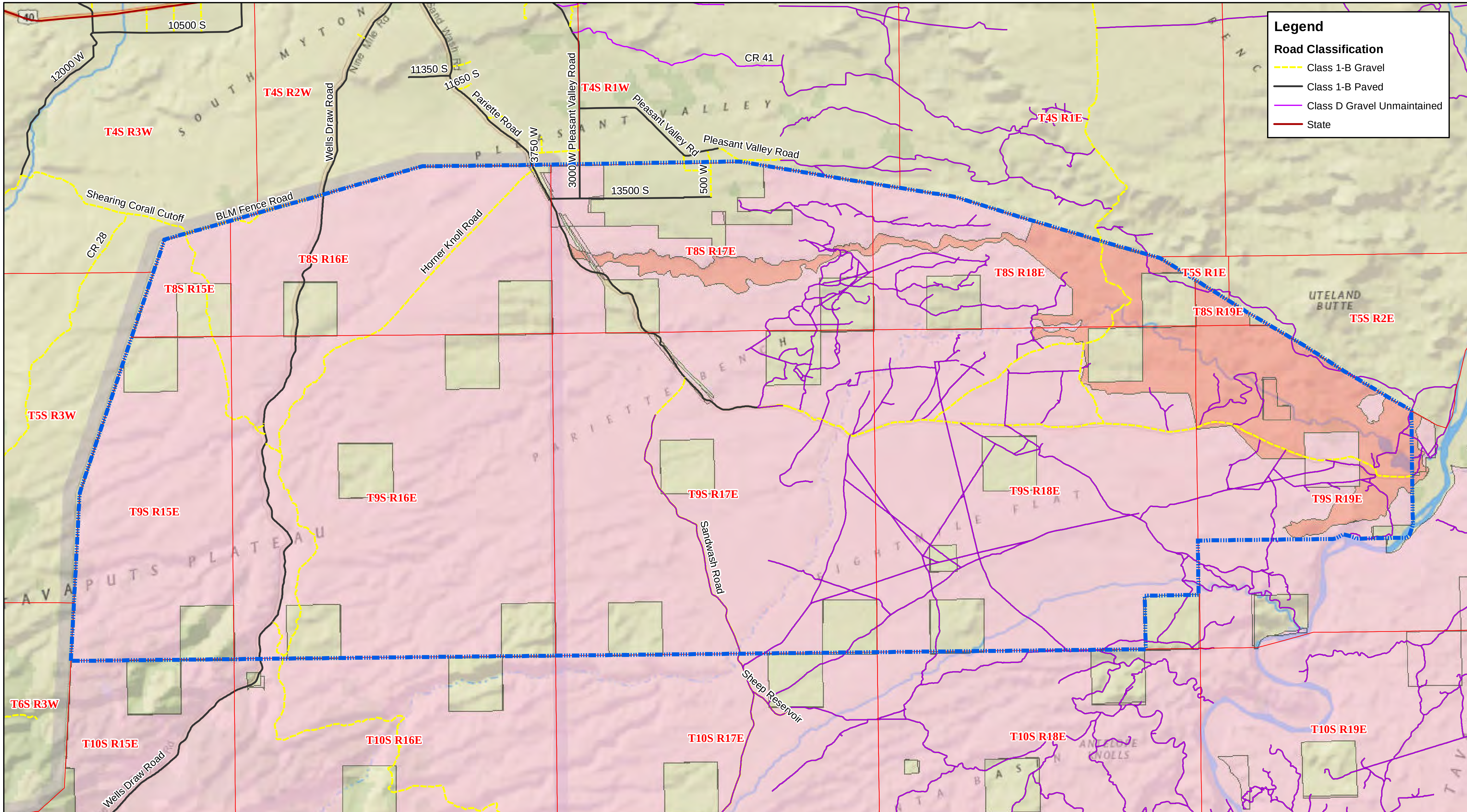
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	10/8/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	SRMA.mxd

Newfield Exploration Company
Monument Butte EIS

SRMAs in the Vicinity of the MBPA

FIGURE
3.13.1-1



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

OHV Status Project Area Boundary

Limited

Closed

N W E S

Base Map: ESRI Online Map
OHV Data: Bureau of Land Management

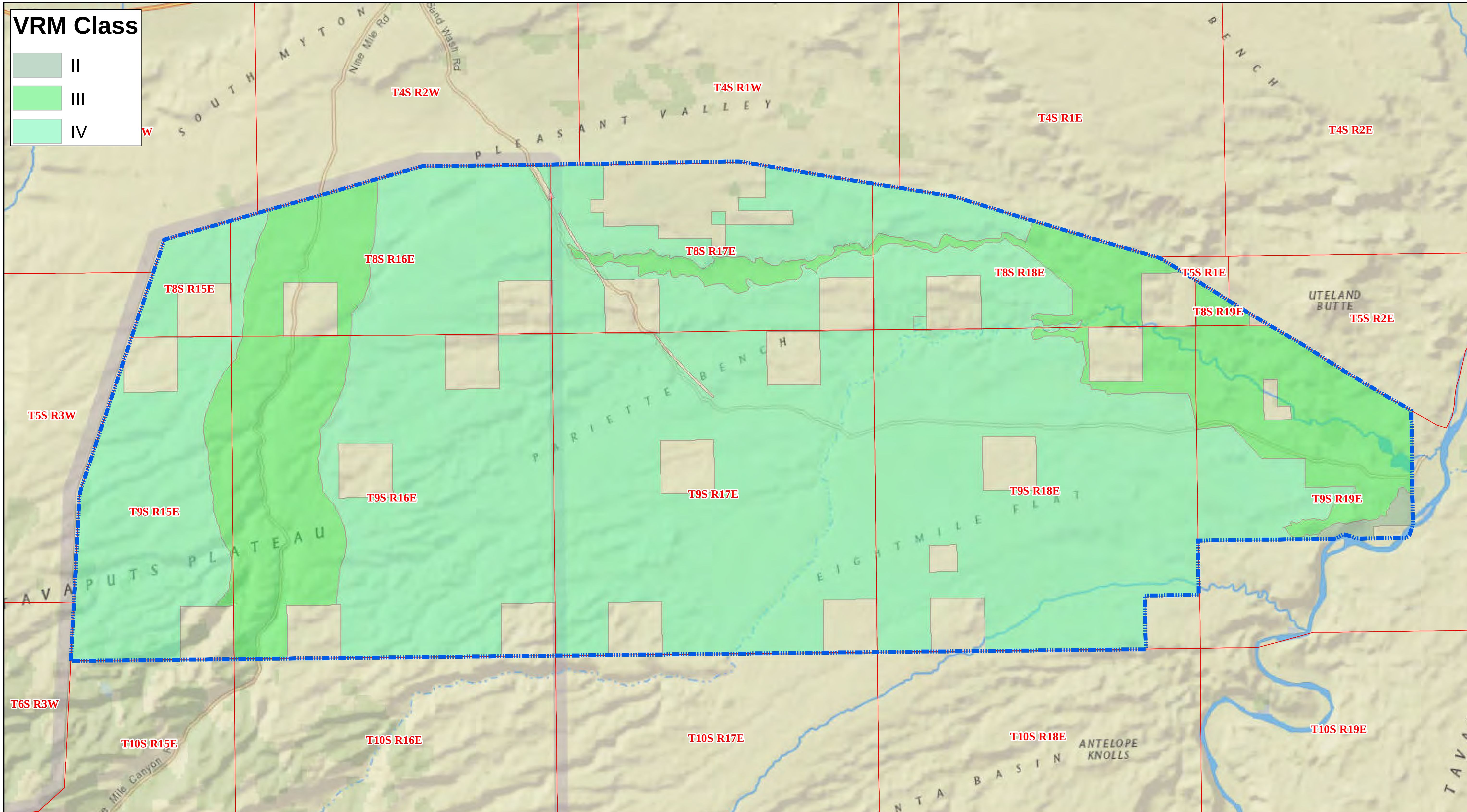
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/10/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	OHV.mxd

Newfield Exploration Company
Monument Butte EIS

OHV Areas in the Vicinity of the MBPA

FIGURE
3.13.2.2-1



0 1.25 2.5 5 Miles

Legend

Project Area Boundary

Base Map: ESRI Online Map
VRM Data: Bureau of Land Management RMP (2010)

N W E S

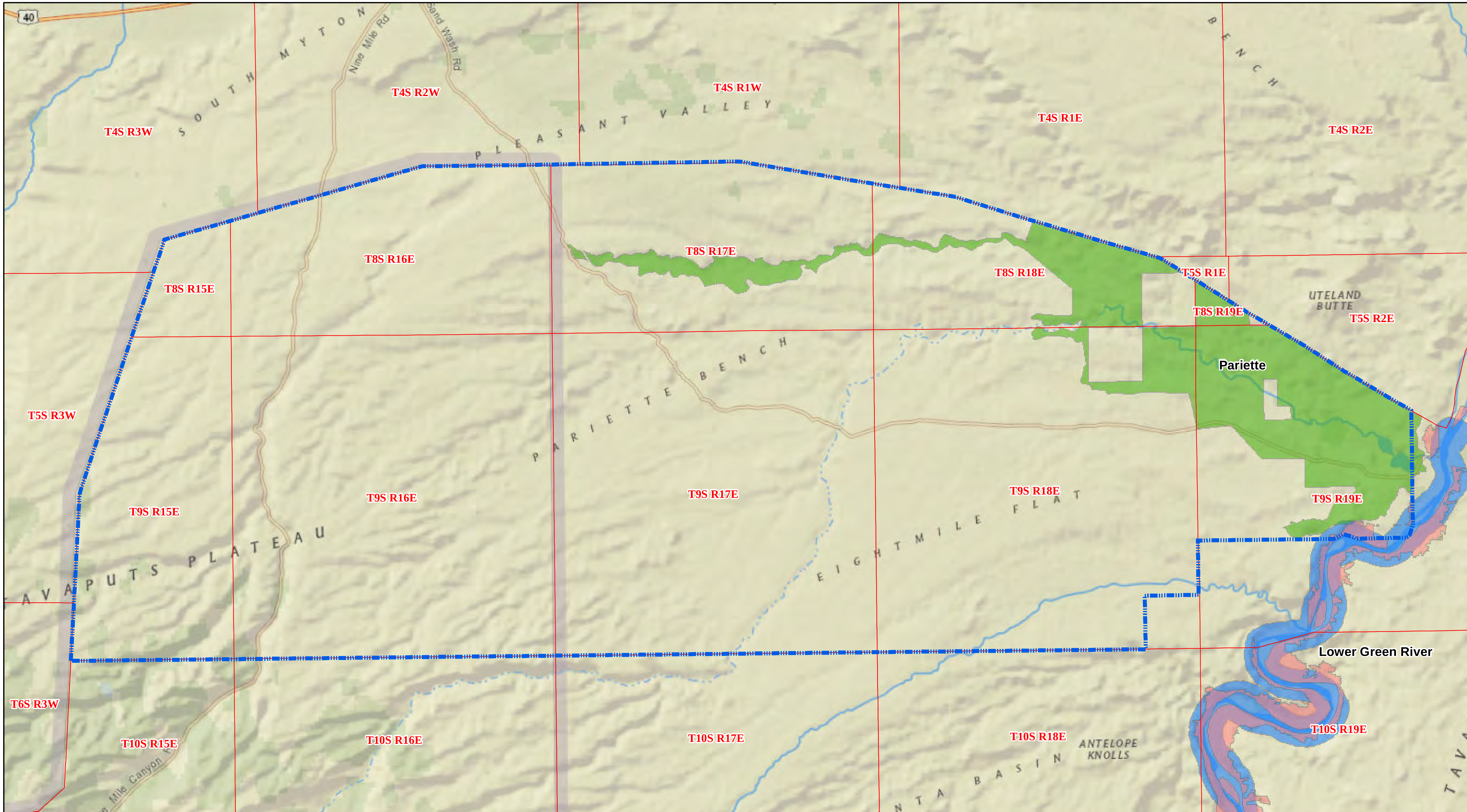
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/9/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	VRM.mxd

Newfield Exploration Company
Monument Butte EIS

VRM Classes
Within the MBPA

FIGURE
3.14.3-1



0 1.25 2.5 5 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

- Project Area Boundary
- Pariette ACEC
- Lower Green River ACEC
- Wild and Scenic Rivers

Base Map: ESRI Online Map
ACEC and Wild and Scenic River Data:
Bureau of Land Management RMP (2010)

N E S W

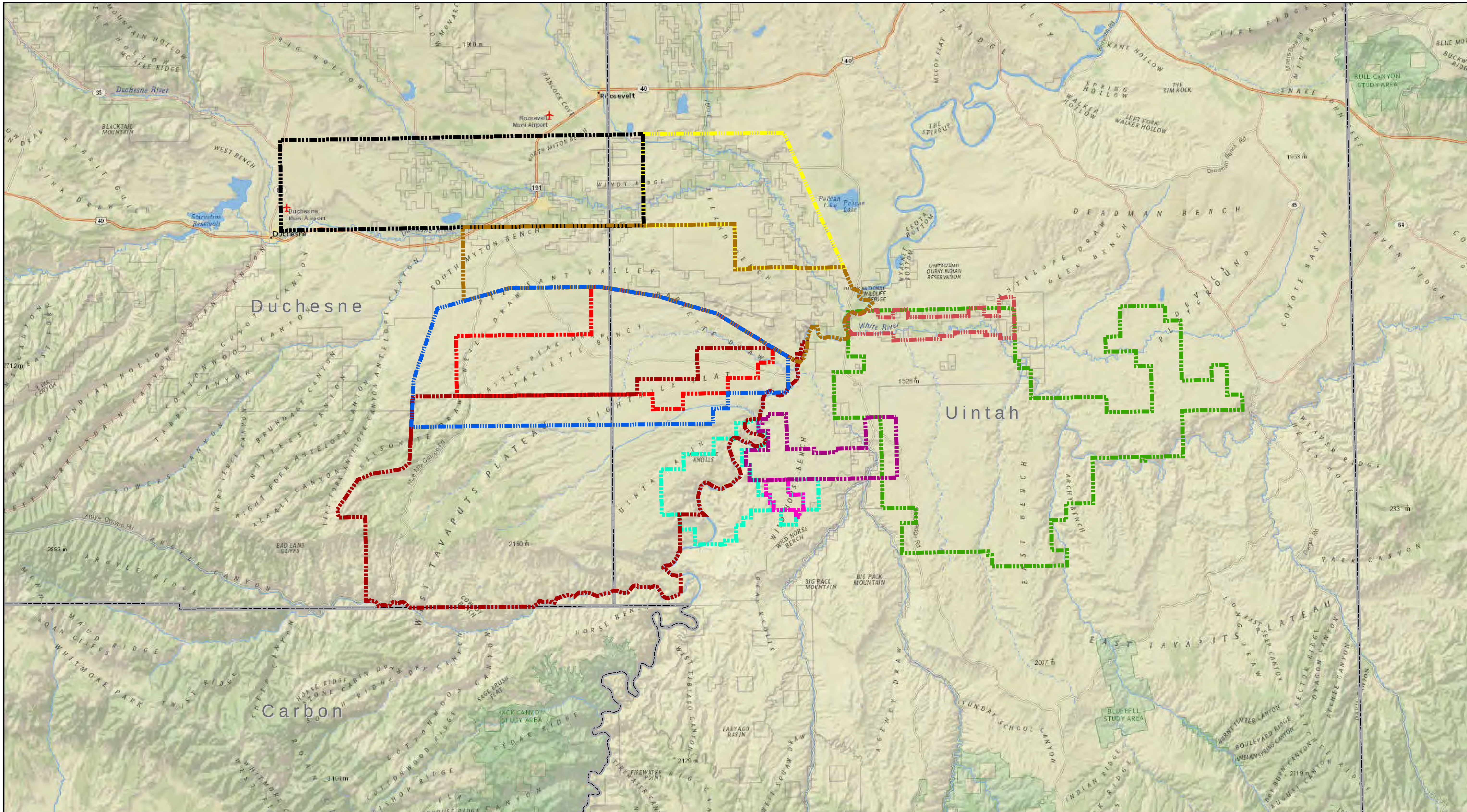
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/12/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	SpecialDesignations.mxd

Newfield Exploration Company
Monument Butte EIS

Special Designations
Within the MBPA

FIGURE
3.15-1



0 2.5 5 10 Miles

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Legend

- Castle Peak and 8-Mile Flat EIS
- Gasco EIS
- Greater Natural Buttes Gas Development
- Kings Canyon
- North Alger EA
- River Bend Unit infill
- Greater Monument Butte EIS - Pending
- Ouray Field EA
- Newfield EDA #1
- Rocky Point EDA EA
- Randlett EDA

Base Map: ESRI Online Map

N E S W

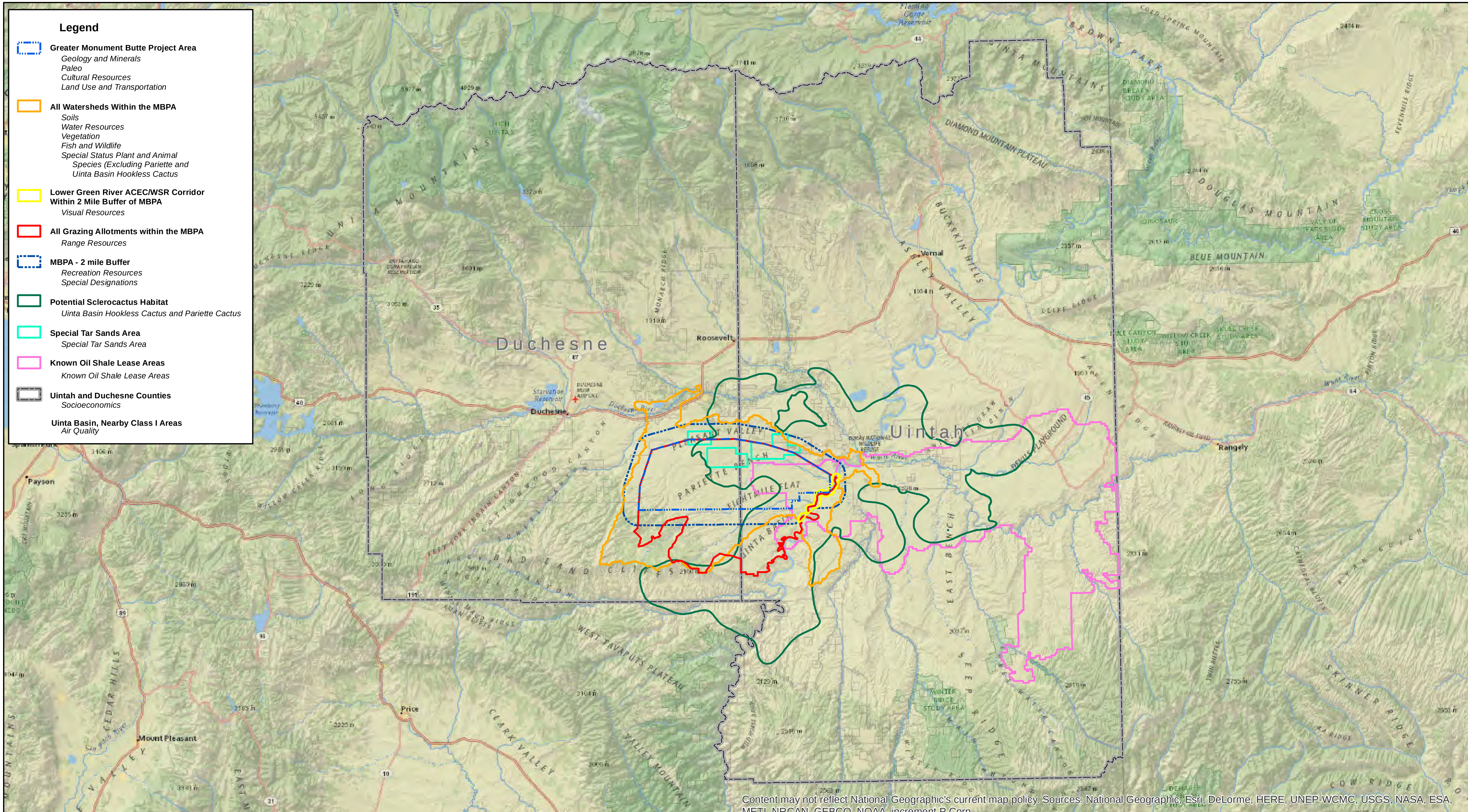
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	116133
DRAWN:	9/9/2013
DRAWN BY:	A.Leonard
CHECKED BY:	J.Habiger
FILE NAME:	EIS_ProjectAreas_v5.mxd

Newfield Exploration Company
Monument Butte EIS

Past, Current, and Reasonably Foreseeable Actions within and Near the MBPA

FIGURE
5.1-1



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

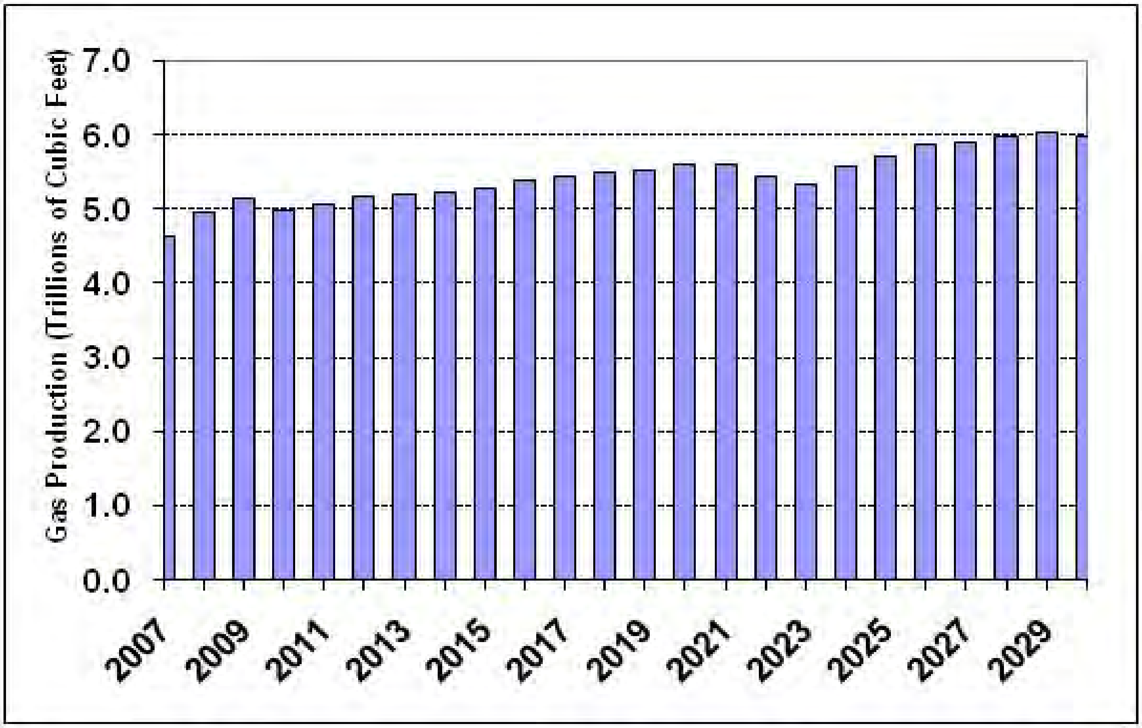
PROJECT NO.	116133
DRAWN:	11/21/2014
DRAWN BY:	A.Leonard
CHECKED BY:	D.Martin
FILE NAME:	CIAAs_v4.mxd

Newfield Exploration Company
Monument Butte EIS

Cumulative Impact Analysis Areas

FIGURE
5.1-2

Figure 5.16.1.1-1. Projected Natural Gas Production in the Mountain Region



Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
Newfield	1	Alternative C	Adequate power resources are a significant issue. In general, Alternative C analyzes 750 wells on 40 acre surface spacing, 2,500 wells on 20 acre spacing and 2,500 deep gas wells. Electric demand would be the highest from the 20 acre wells, which require up to 100kW per well for both rotating equipment and heating energy needs. The 40 acre wells would be converted to injection and any electrical service would be transferred to a 20 acre well, so the 40 acre wells will not add to demand. However, the deep gas wells could require artificial lift in their operating life to lift water. Demand for these wells is estimated at up to 50kW/well. ***This quantity of demand would exceed the capacity of the Bonanza Coal Fired Plant so self-generation would be necessary***. Implementation of Alternative C would require the installation of eleven "generating stations" comprised of two 20MW gas turbine generators ("GTG") and one 10MW steam turbine which will generate 550MW. Newfield has estimated the lifetime cost of self-generation at $600 million each for 11 generation stations, including distribution systems but excluding on-drill pad electrification costs and fuel value. As outlined in the table, about 57% of the supply would be for Green River development, the balance for Deep Gas. All costs (facility, distribution and wells), reduced to a per-Green River-well basis, exceeds $1.4 million. This amount exceeds all current well specific development costs (i.e., current drilling, completion and facility costs combined) and would make Green River wells uneconomic. Alternative C would end Green River development. Deep Gas cost, on a per well basis would be $1.14 million.	Alternative C has been modified to identify the additional costs of electrification. The potential for Newfield to abandon the project and the subsequent loss of potential revenue and jobs from oil and gas development has been disclosed in the socioeconomic analysis.
Newfield	2	Alternative C	In addition to the aforementioned cost constraints for Alternative C, the proposed right of way ("ROW") for construction and maintenance is too small as proposed. The following ROW widths are required: • Distribution 24.5kv – 50' • Transmission 69kv – 60' • Transmission 138kv – 100' – dual pole -150' The ROW for electricity is fixed for the life of the project, not reduced after construction for maintenance issues, like roads and pipelines. The ROW disturbance of 156 miles may also be too low for the scope of distribution system posed in Alternative C. Each 40 acre well pad is 1,320 feet from the next. Assuming each pad is electrified for the 2,500 wells to be drilled under the Green River development, at least 625 miles of ROWs would be required for power lines. Sharing existing road and pipeline ROWs is preferred, but some widening will be required as power poles must be set back from pipeline alignments sufficiently to enable maintenance activities without impacting co-located services.	Disturbance calculations for Alternative C have been modified accordingly. Resource-specific disturbance calculations under Alternative D have also been modified accordingly.
Newfield	3	Alternative D	Operational Assumptions Alternative D (p 2-67; Table 2.6-1; and Figure 2-4) specifies that the number and type of wells will be 204 40-ac oil, 3,315 20-ac oil and 1,539 40-ac gas.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Newfield Comment: BLM's assumptions of decreasing the number of 40-ac oil wells while increasing the number of 20-ac oil wells is not feasible as infill spacing and associated secondary recovery is not possible without first initiating primary recovery on 40-ac downhole spacing (see Newfield's Technical Summary Below). This conclusion failed to consider the technical requirements of developing this specific waterflood pattern to maximize production. Action: Throughout Alternative D (p 2-65 – 2-74) BLM needs to clarify if their Alternative was designed to truly mandate a decrease in 40-ac oil development or whether they improperly differentiated between a vertical 40-ac well, a directional 40-ac well, and a directional 20-ac well (i.e., intent was to increase mandates for directional drilling).	the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
	4	Alternative D	Adjusting New Development Based on Existing Well Density Section 2.6.3 states that in high density sections, four of the 16 existing well pads (i.e., 160-ac surface well pad spacing) would be allowed to be expanded by 0.2 acres to accommodate up to four additional wells. Newfield Comment: (Section 2.6.3) BLM's assumption of only allowing four pads to be expanded by 0.2 acres is not feasible as this expansion would not be large enough to accommodate 4 additional wells. Action: Section 2.6.3 and all other references to pad expansions need to be revised to state that pads would have to be expanded by 0.2 acres per well (e.g., 4 additional wells would require a 0.8 acre expansion).	Alternative D has been modified to clarify that well pads would have to be expanded by 0.2 acres per new well.
Newfield	5	Alternative D	Newfield Comment: (Section 2.6.3 – p 2-66; 3rd paragraph) BLMs assumption of only allowing up to four additional wells per existing pad would not be sufficient for full 20-ac oil development and 40-ac deep gas development within a given section. Action: In order to accommodate this spacing, each pad would need to accommodate 8 additional wells and pads would have to be 4.4 acres in size (3.0 acres for vertical deep gas and 1.4 acres for 7 additional directional wells) (see Figure 1 in Appendix A). Section 2.6.3 should be revised to reflect these changes and all surface disturbance calculations should be revised.	Alternative D has been modified as suggested.
Newfield	6	Alternative D	Newfield Comment: Figure 2.6-2 does not accurately reflect 20-ac patterns for Green river oil development and the figure does not include any deep gas development. Action: Figure 2.6-2 should be revised to show 8 additional wells on each 160-ac spaced pad (see Figure 1 Appendix A). In addition, an additional Figure should be added to show BLMs concept in the low density areas (see Figure 3 Appendix A). In this figure each 160-ac spaced pad would need to show 12 wells per pad (1 Vertical 40-ac oil; 3 Directional 40-ac oil; 4 Directional 20-ac oil; 1 Vertical gas; 3 directional gas).	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
Newfield	7	Alternative D	Newfield Comment: In order for 20-ac development to occur on 160-ac surface spacing, specific patterns for host pad locations would have to be maintained.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Should site specific conditions prevent subsequent expansion of the pad locations needed to maintain the pattern, additional wells would be lost. Action: The alternative needs to define exceptions, modifications, and waivers that could be implemented by BLM which would allow host pad locations to be altered based upon site specific conditions.	comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
Newfield	8	Alternative D	Section 2.6.3 also states wells not hosting additional producing wells (i.e., remaining 12 well pads) would be reclaimed to 0.26 acres and producing wells would be converted to water injection. Newfield Comment: BLM's assumption of only converting 12 of the 16 wells in a section does not accurately depict the process of infill secondary recovery via waterflood (Section 2.6.3; p 2-66; 3rd and 4th paragraph). Action: Revise Section 2.6.3 to state that maximum secondary oil recovery occurs if, prior to drilling 20-ac wells, all 40-ac producing wells in a section are converted to water injection. As such, in certain cases, all 16 existing pads may have a water injection well and its associated infrastructure. Section 2.6.7 should also be revised to accurately reflect the water usage associated with converting all 40-ac wells regardless of whether the wells were drilled vertically or directionally.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
Newfield	9	Alternative D	Newfield Comment: BLM's assumption that 0.26 acres is the average area of disturbance associated with an injection well is not accurate (Section 2.6.3; p 2-66; 3rd and 4th paragraph). To follow health and safety requirements, an injector well pad must be large enough to accommodate a workover rig and crew in the events that well maintenance or recompletions are required. Newfield requires a pad size of 1.0 acre for existing injection well pads to safely operate these wells (see Appendix A). Action: BLM must revise Section 2.6.3 and all surface disturbance calculations referring to injection well pad reclamations to a minimum size of 1.0 acres.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
Newfield	10	Alternative D	(Section 2.6.3; p 2-66; 5th & 6th paragraph) In low density sections, the proposed surface density would be limited to no more than four well pads (i.e., 160-ac surface well pad spacing) and the number of wells per pad would not be limited. Under these restrictions it is assumed that each pad would need to accommodate 12 wells (1 Vertical 40-ac oil; 3 Directional 40-ac oil; 4 Directional 20-ac oil; 1 Vertical gas; 3 directional gas)(see Figure 3 in Appendix A). Newfield Comment: Surface restrictions (i.e., 160-ac surface pad spacing) outlined in Alternative D would present significant technical and operational obstacles that would render the project economically unsustainable (see Appendix A). Specifically these restrictions would result in the loss of 653 wells	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			and waste of over 58 MMBOE. This would result in economic losses of over $263 million in Federal royalties, over $198 million in State royalties, over $30 million in State severance tax, over $47 million in ad valorem tax, over $6 million in conservation tax, and over $38 million in direct revenue for SITLA (see Appendix B). Action: Alternative D (Section 2.6.3; 2.6.4; 2.6.5; 2.6.6 and 2.6.7) should be revised to state that implementation of mandated 160-ac surface pad spacing would result in the loss of all directional 40-ac oil wells and their subsequent waterflood expansion (i.e., supporting 20-ac infill wells) due to parameters defined in Appendix A. In addition, Section 4.16.1.4 should be updated to include a summary of the socioeconomic impacts of implementing these surface restrictions.	
Newfield	11	Alternative D	(Section 2.6.3; p 2-66; 6th paragraph) BLM assumes that the volume of water needed and the number of injection wells would be higher under Alternative D because the number of oil wells requiring secondary recovery would be higher. Newfield Comment: BLM does not accurately differentiate between vertical 40-ac wells, directional 40-ac wells and directional 20-ac wells. In addition, BLM inaccurately assumes that all directional wells would be converted to water injection. BLM also does not recognize that their proposed surface restrictions would eliminate 40-ac primary producing wells which would eventually be converted to water injection. Action: Alternative D (Section 2.6.3 and 2.6.7) should be revised to reflect that all 40-ac wells, regardless of being drilled vertically or directionally, would be converted to water injection. In addition, since the number of 40-ac wells would decrease under Alternative D, BLM needs to accurately reflect that the volume and number of wells that would be converted under Alternative D would actually be less than the proposed action.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
Newfield	12	Alternative D	Minimizing Disturbance in USFWS proposed CCAs Newfield Comment: Alternative D (Section 2.6.2) references adoption of USFWS management guidelines and recommended protection of Core Conservation Areas, however these guidelines are not included or referenced in the document. Action: The guidelines should be included as an Appendix to the MB EIS.	The USFWS core conservation areas draft management guidelines for Sclerocactus have been added to the FEIS as Appendix I.
Newfield	13	Alternative D	Newfield Comment: Alternative D (Section 2.6.2) explicitly restricts additional surface disturbance in large portions of the MBPA with no exceptions, modifications or waivers. Implementation of these restrictions would prohibit development of valid existing leases and would result in significant resource waste and losses in Federal and State revenues. Newfield believes that there are several best management practices that could be implemented in the MBPA and several off-site mitigation measures that if implemented could provide greater benefit to the Hookless Cactus than simply prohibiting additional surface disturbance. Examples of these measures could include: • Expansion of existing pads for directional drilling;	Alternative D has been modified to provide for limited new surface disturbance within the CCAs in recognition of the right to develop associated with each affected lease.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			• Installation of surface flowlines to remove tank batteries and eliminate truck traffic to existing pads in CCAs; • Road paving or enhanced dust abatement; • Offsite mitigation, including: o Seed collection and replanting o Large Scale surveys or inventories o Funding of research objectives. Action: Newfield encourages BLM to implement these additional BMPs or off-site mitigation as options to allow additional development in the proposed Core Conservation Areas.	
Newfield		Alternative D	Newfield Comment: Section 2.6.2 should be revised to clarify whether additional wells could be drilled from existing pads if no pad expansion were to occur in Level 1 Areas.	Alternative D has been modified to reflect conditions under which well pad expansions would be allowed in the CCAs.
Newfield	14	Alternative D	Newfield Comment: Alternative D (Section 2.6.2) prohibits surface disturbance in Level 1 areas but mandates well conversion. In order for producing wells to be converted, waterlines must be installed. BLM needs to clarify if surface disturbance would be allowed for waterline installation.	Alternative D has been modified to reflect conditions under which well pad expansions and other development would be allowed in the CCAs.
Newfield	15	Alternative D	**Newfield Comment**: Cactus Core Area 1 restrictions would result in a loss of 180 wells. This would result in a loss of over $108 million in royalties to the State, over $143 million in royalties to the Federal Government, and over $22 million in Severance tax. BLM needs to identify the number of wells lost as a result of implementing the CCA 1 restriction in Section 2.6.2, and socioeconomic impacts need to be added to Section 4.16.1.4.	Based on the edits to Alternative D, which now accounts for development within the CCAs, and a well count consistent with the Proposed Action, this comment is no longer applicable.
Newfield	16	Alternative D	Level 2 Areas – Surface disturbance would be minimized to the greatest extent practical by using existing infrastructure (i.e., access roads and pipelines) and directional drilling from multi-well pads that would limit the number of new pads (Section 2.6.2). Newfield Comment: Cactus Core Area 2 restrictions would result in the loss of an additional 96 wells. This would result in a loss of over $26 million in royalties to the State, over $34 million in royalties to the Federal Government, and over $4 million in Severance tax. BLM needs to identify the number of wells lost as a result of implementing the CCA 2 restriction in Section 2.6.2, and socioeconomic impacts need to be added to Section 4.16.1.4.	Based on the edits to Alternative D, which now accounts for development within the CCAs, and a well count consistent with the Proposed Action, this comment is no longer applicable.
Newfield	17	Alternative D	Surface disturbance in Level 2 areas already exceed the 5% surface disturbance threshold (section 2.6.2) Newfield Comment: BLMs references (Section 2.6.2) that disturbance in the Level 2 area has exceeded the 5% threshold fail to provide any background methodologies or statistics to support this statement. Action: In 2013 Newfield conducted aerial photography interpretation of existing disturbances in both the Upper Pariette and Lower Pariette habitat polygons. Current disturbances in Level #2 Core Areas for each polygon are as follows: Upper Pariette = 570 acres (3.7%) and Lower Pariette = 99 acres (1.6%)	Sections 3.10.1.2.1 and 5.10.2.1 have been revised with the following discussion regarding existing disturbance: The USFWS and Newfield have different methods of calculating surface disturbance. This discussion reflects both methodologies, and thus a range of existing disturbance within the Core Conservation Areas Under Newfield's assumptions, existing disturbance was determined using a custom dataset developed by Spatial Energy for Newfield based on aerial imagery analysis, which was flown annually for the MBPA between 2006 and 2013 and is referred to as "SPOT6" data. Additional information on existing disturbance was collected using a May 2014 "vendor" map that illustrates existing facilities and infrastructure within the MBPA. For portions of the Core Conservation Areas that did not have SPOT6 data or vendor map information, Newfield relied on

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			for a total disturbance of 669 acres (3.1%). Sections 2.6.2; 3.10.2.2; 4.10.1.1; 4.10.1.2; 4.10.1.3; 4.10.1.4; and 5.10.2 needs to be revised to reflect these numbers.	sources such as as-built diagrams and plats from land surveyors that contain accurate information on existing facility locations and sizes. To calculate existing disturbance the USFWS assumes 5 acres of disturbance for every well.
Newfield	18	Alternative D	Restrictions would result in the loss of 155 pad locations (Section 2.6.2). Newfield Comment: As stated previously, Cactus Core Area restrictions (Level 1 and Level 2) would incrementally result in the loss of 276 wells. This would result in a loss of over $134 million in royalties to the State, over $178 million in Federal royalties, and over $26 million in Severance Tax. BLM needs to revise the number of wells lost as a result of implementing the CCA 1 and CCA 2 restrictions in Section 2.6.2, and socioeconomic impacts need to be added to Section 4.16.1.4.	Based on the edits to Alternative D, which now accounts for development within the CCAs, and a well count consistent with the Proposed Action, this comment is no longer applicable.
Newfield	19	Alternative	Newfield Comment: In the sections 2.2, 2.3.1.1, 2.5, 2.6.1, 2.6.2, 3.15.1.1, 4.15.1.1.1, 4.15.1.4.1 of the DEIS, BLM fails to acknowledge that the majority of the leases in the ACEC predate the subsequent designation of the Pariette ACEC. As such, BLM cannot implement restrictions that would prevent development of the valid existing leases. The DEIS (Sections 2.2, 2.3.1.1, 2.5, 2.6.1, 2.6.2, 3.15.1.1, 4.15.1.1.1, 4.15.1.4.1 and others) must be revised to reflect that Newfield's federal oil and gas leases are valid existing lease rights, issued prior to the ACEC designation in the Vernal RMP and Diamond Mountain RMP. Newfield Comment: Section 3.15.1 (ACECs) specifically states that ACECs "do not automatically prohibit or restrict other uses in the area". Currently surface restrictions in Alternative D (Section 2.6.1) would prohibit future oil and gas development in the ACEC. Action: Alternative D (Sections 2.6.1) should be revised to include exceptions, modification or waivers that could be implemented to allow additional development of leases that pre-date the ACEC.	Section 1.5 acknowledges that most of the leases are valid existing rights that predate the Vernal RMP, which is the land use plan in effect at this time. This section also acknowledges that these valid pre-existing rights are not subject to LUP decisions if the decisions conflict with the lease rights.
Newfield	20	Alternative D	Newfield Comment: BLM states that advancements in horizontal drilling have increased the maximum horizontal displacement distances of up to 2,500 feet without significant technical and economic challenges. A general statement of horizontal drilling technology without application to the specific project is unwarranted for this project. Oil recovery in the MBPA comes from shallow sands that are discontinuous aerially and vertically, which is not conducive to production through horizontal drilling and completions practices. In addition, Newfield does not agree that utilizing a directional well displacement of 2,500 feet can occur without significant technical and economic challenges (see Appendix A). Action: All references to horizontal drilling in the Section 2.6.1 needs to be revised to reflect that all directional 40-ac oil wells would be lost due to parameters defined in Newfield's Technical Summary. BLM should remove the statement and references to 2,500 feet because it is unsupported in the DEIS and would lead to uneconomic development of Newfield's leases.	Based on the edits made to Alternative D the majority of this comment is no longer applicable. However, horizontal displacement distances have been corrected based on feedback from the proponent and verification from BLM's engineers.
Newfield	21	Alternative D	No new surface disturbance or well pad expansions would be allowed on Federal lands in the ACEC (Section 2.6.1).	Alternative D has been modified to reflect conditions under which well pad expansions and other development would be allowed in the ACEC.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Newfield Comment: Section 2.6.1 should be revised to clarify whether additional wells could be drilled from existing pads if no pad expansion were to occur.	
Newfield	22	Alternative D	No new surface disturbance or well pad expansions would be allowed on Federal lands in the ACEC (Section 2.6.1). Newfield Comment: Alternative D (Section 2.6.1) prohibits surface disturbance in the ACEC but mandates well conversion. In order for producing wells to be converted, waterlines must be installed. BLM needs to clarify if surface disturbance would be allowed for waterline installation.	Alternative D has been modified to reflect conditions under which development would be allowed in the ACEC.
Newfield	23	Alternative D	Development could continue on State and private lands (Section 2.6.1). Newfield Comment: BLM must revise Section 2.6.1 to clarify that State and private lands are not part of the ACEC and therefore no surface restrictions would be applied, and that BLM may not restrict access to these locations including the upgrading or installation of new pipelines to these state and private minerals. Newfield Comment: The language in Alternative D (Section 2.6.1) as well as the associated maps (Figures 2-4; 2-6-1) do not accurately depict full 20-ac oil and 40-ac deep gas development on State sections and on private lands in the ACEC. In addition, the alternative does not accurately describe that existing and future well pads on State and private lands could be utilized for future directional drilling of Federal minerals in the ACEC. Action: The Alternative (Section 2.6.1) and associated maps (Figures 2-4; 2-6-1) should be revised to accurately depict full development of State and private lands, including access and pipelines to these locations, as well as the opportunity to utilize these pad locations for future directional drilling.	Text and figures have been modified to account for development on State and private lands.
Newfield	24	Alternative D	Restrictions would result in the loss of 62% of natural gas reserves in the ACEC (6,605 acres) due to limitations on directional reach from drilling locations (Section 2.6.1). Newfield Comment: BLM references regarding reserves (Section 2.6.1 and 3.3.4.1) are not accurate, nor is the information in the reference appropriate for calculating such information. Action: This information and the citation should be removed from the EIS (Section 2.6.1 and 3.3.4.1).	The FEIS has been edited as suggested.
Newfield	25	Alternative D	Newfield Comment: The proposed surface restrictions for the ACEC proposed in Alternative D would result in the loss of 219 wells. This would result in a decrease of 33 MMBOE which would result in the loss of over $129 million in royalties to the State, over $172 million in royalties to the Federal Government, and over $25 million in Severance tax. BLM needs to revise the number of wells lost as a result of implementing the Pariette ACEC restrictions in Section 2.6.1, and socioeconomic impacts need to be added to Section 4.16.1.4.	Based on the edits applied to Alternative D this comment is no longer applicable.
Newfield	26	Alternative D	No new surface disturbance within 100-year floodplains and riparian areas (Section 2.6).	Alternative D now includes the following restrictions in 100-year floodplains and riparian habitat: • No new well pads would be allowed in 100-year floodplains or riparian areas.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Newfield Comment: Although Alternative D (Section 2.6) states that no new surface disturbance would be allowed within 100-year floodplains or riparian areas, no additional details are provided on the potential impact of these restrictions on proposed development. Action: BLM needs to quantify the potential impact of these restrictions, including the economic impacts to these restrictions to state and local economies.	• New roads or pipelines would be minimized within 100-year floodplains. • No new roads or pipelines would be allowed in riparian areas. ○ When it is necessary to cross a 100-year floodplain to access otherwise isolated portions of the unit or leases, BLM would give priority consideration to utilization of existing roads and pipelines. Limited new roads and pipeline crossings of 100-year floodplains may be allowed only if all other alternatives would result in significantly greater resource impacts. Based on these changes there is no anticipated loss of wells.
Newfield	27	Alternative D	Newfield Comment: Based upon the linear distribution of 100-year floodplains and riparian areas, restricting all surface disturbances to these areas would have significant impacts on access and pipeline corridors. In addition, complete avoidance of these areas would likely result in greater impacts as road and pipeline corridors would be much longer. Action: Exceptions, modifications or waivers need to be added to Alternative D (Section 2.6) that would allow surface disturbance to occur in these areas should alternatives result in greater impacts.	Alternative D includes the following restrictions in 100-year floodplains and riparian habitat: • No new well pads would be allowed in 100-year floodplains or riparian areas. • New roads or pipelines would be minimized within 100-year floodplains. • No new roads or pipelines would be allowed in riparian areas. ○ When it is necessary to cross a 100-year floodplain to access otherwise isolated portions of the unit or leases, BLM would give priority consideration to utilization of existing roads and pipelines. Limited new roads and pipeline crossings of 100-year floodplains may be allowed only if all other alternatives would result in significantly greater resource impacts.
Newfield	28	Alternative D	Newfield Comment: Section 3.6.2.3.2, BLM specifically references USGS studies finding that the surface disturbance associated with oil and gas development does “not have a statistically significant impact to TDS concentrations in surface waters.” Section 3.6.2.3.2 also states that oil and gas development in the Pariette Draw TMDL is “not [an] important factor in selenium or boron transport or surface water concentrations.” Further, BLM estimates that the sediment loading into the Green River under the Proposed Action will increase by less than 0.1 percent during the Well Drilling and Completion Phase and the Production Phase. See DEIS § 4.6.1.1.1.4. Overall, despite a despite a 95 percent decrease in surface disturbance between the Proposed Action and the No Action Alternatives, erosions delivered to project area drainages and tributaries would only be decreased by 20 percent under the No Action Alternative. See DEIS § 5.6. The minimal impact to sediment deposition in surface water is contrary to BLM’s present decision to impose NSO restrictions upon floodplain and riparian areas within the MBPA. Action: BLM should remove the NSO restrictions upon oil and gas development in floodplain and riparian areas (Section 2.6) because oil and gas development does not have a statistically significant impact upon TDS, TMDL and sediment concentrations in surface water and any potential impact can presumably be successfully mitigated through applicant-committed environmental protection measures (ACEPMs) identified in Sections 2.2.13.3 and 2.2.14.4. These ACEPMs are tailored to specifically to avoid erosion and capture the sediment produced from development operations.	Thank you for your comment. We recognize that erosion and sedimentation ACEPMs are incorporated into the alternatives. However, increased sedimentation is not the only concern behind the surface use restrictions in floodplain and riparian areas. Additional concerns include contamination from spills.
Newfield	29	Air Quality	Newfield Comment: Regarding air quality in general, record of decisions for NEPA documents for oil and gas projects do not themselves authorize any activity capable of emitting air pollutants. Companies must obtain a permit and	Thank you for your comment. No edit requested.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			authorization from the Utah Division of Air Quality ("UDAQ") (or the Environmental Protection Agency ("EPA") if within Indian Country) before constructing any regulated emission source that is analyzed in the NEPA document.	
Newfield	30	Air Quality	Newfield Comment: Regarding air quality analyses, it is inappropriate for BLM to assume the worst case scenario for air quality and require overly burdensome air quality mitigation measures based upon a worst case scenario.	Worst case, while not necessarily representative of average conditions, is the standard by which air quality analyses are frequently made. This is consistent with previous NEPA nationally, and is considered proper procedure.
Newfield	31	Air Quality	Newfield Comment: In Section 2.2.12.1 Newfield proposed to employ reduced emission completion practices when feasible to minimize VOC emissions from hydraulically fractured high pressure gas well flowback operations. The protective measure as presented in the DEIS was, however, expanded to include the management of recovered liquids. In addition, some provisions addressing flowback emissions, including the last sentence, may be interpreted to be inclusive of low pressure oil wells. The management of flowback fluids would be conducted in accordance with applicable Utah Division of Oil, Gas and Mining rules including: R649-3-15 Pollution and Surface Damage Control; R649-3-16 Reserve Pits and Other On-site Pits; R649-3-39 Hydraulic Fracturing; and R649-9-2 General Waste Management. These rules require the proper management of recovered liquids, thus the inclusion of recovered liquids in the ACEPM is unnecessary is duplicative. The very nature of low pressure black wax oil wells makes the capture and control of the resulting small volumes of recovered gas very difficult. In fact, 98% of completed GMBU oil wells are placed on artificial lift after the conclusion of completions operations due to low pressures. To minimize emissions and maximize economic value, flowback operations are conducted until significant hydrocarbons are visually detected or the well dies due to lack of pressure. After the completion of rig operations, the well is placed on production and all produced gas is captured for use as fuel or processed for delivery to a sales pipeline. The low volume of gas associated with black wax well completions, and the lack of pressure necessary to efficiently operate capture and control equipment, makes the control of flowback gas technically challenging. Furthermore, attempts to capture and contain flowback gas by unconventional means would likely result in an increased risk to safety. Action: The requirements for employing reduced emission completion practices in Section 2.2.12.1.2 should be removed and not imposed upon oil wells.	Newfield makes a technical argument that utilizing gas recovery on low pressure oil wells is technically challenging and resulting gas capture would be very low in terms of amount of potential fugitive gas captured. NSPS Subpart OOOO generally does not apply to oil well completions because emissions from oil wells are considered minimal. After review BLM agreed that potential fugitive VOC reductions from including low pressure oil wells would not be cost effective and unlikely to result in significant reduction of VOC emission. Edit to 2.2.12.1.2 text to specify that oil wells are not included and the mitigation only applies to high-pressure gas wells. Also removed the options to store or re-inject recovered liquids and route recovered gas to a gas well during completion.
Newfield	32	Air Quality	Newfield Comment: The first bullet under production operations (Section 2.2.12.1.3) refers to pneumatic device ACEPM. The pneumatic device ACEPM was expanded to include the following passage "Intermittent pneumatic devices will be operated such that average emissions are no greater that for a low bleed device." There are two basic types of pneumatic controllers; continuous bleed and intermittent bleed. Continuous bleed devices utilize a constantly flowing stream of gas which is vented through a small nozzle to the atmosphere.	Edit made so that ACEPM does not mention the operation of intermittent bleed devices, in alignment with NSPS Subpart OOOO. Intermittent bleed devices are still included in the ACEPMs as devices that can be used to minimize VOC emissions however.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Continuous bleed devices with a flow rate of 6 scf/hour or greater are considered to be high bleed, while devices which flow less than 6 scf/hr are categorized as low bleed. Manufacturers frequently provide flow rate data for their constant bleed devices and this information is typically relied on to calculate emission rates. In contrast to continuous bleed devices, intermittent controllers do not constantly vent, but instead utilize an actuator and valve system that is normally closed. When action of the intermittent controller is required, gas contained within the actuator is utilized and then released to the atmosphere. The device actuator is sized according to the duty it must perform. Furthermore, there are no service adjustments accessible to the operator to control the venting from intermittent devices. Thus the vent rate of intermittent devices is regulated by the number of times they are actuated during the course of the day. Newfield typically utilizes five or more intermittent control devices at each wellsite including back-pressure valves, level controllers and thermostats. There is no practical means to count or otherwise determine the number of times each one of these intermittent devices is actuated during the course of the day and thereby demonstrate average emission rates no greater than low bleed devices. In addition, there are no practical means by which an operator can regulate emissions from intermittent devices other than shutting in the well and ceasing operation. To limit the number of time a device activates in the day is to effectively prevent the device from performing its intended function. Action: The "applicant committed measure" concerning the operation of intermittent pneumatic devices must be removed from the Final EIS because it is impossible to comply with and impossible to prove compliance with. The replacement requirement should be reworded so it is fully consistent with the requirements of the Quad O regulations.	
Newfield	33	Air Quality	Newfield Comment: BLM also expanded the fifth bullet in Section 2.2.12.1.3 to include all tanks with emissions greater than 20 tpy. Newfield is the operator of record for the GMBU and therefore has assumed responsibility for operations on the behalf of other interest owners. Newfield therefore is charged with the duty to responsibly operate the unit efficiently for the long term benefit of all lease holders. In the foreseeable future it is reasonable to expect that State and /or Federal implementation plans may be developed and implemented to address the elevated ozone concentrations currently monitored in the basin. The plans would include emission offset provisions applicable to new development. By taking early action to control stock tanks with emissions greater than 20 tons per year that are not otherwise obligated to do so now by regulation, Newfield would in effect be forfeiting potentially significant opportunities to generate emission reduction credits that would be critical to the future operation and development of the Unit. Therefore, the time frame for implementing controls on historical tank batteries with emission greater than 20 tons per year should be extended to 24 months after the applicable agency for air quality has established a functional emission credit banking system.	Edit to document made by removing tank control ACEPM for all tanks over 20 tpy. The ACEPM regarding Quad O applicable tanks being controlled if over 6 tpy has been left in. A new BLM mitigation in 2.2.14 was added such that "Newfield would comply with the applicable requirements of UDAQ Rule 307-401-8a as they apply to the installation of Best Available Control Technology (BACT) compliant emission controls on tanks which requires the degree of pollution control for emissions to be at least best available control technology. When determining best available control technology for a new or modified source in an ozone nonattainment or maintenance area that will emit volatile organic compounds or nitrogen oxides, best available control technology shall be at least as stringent as any Control Technique Guidance document that has been published by EPA that is applicable to the source." This new BLM mitigation would ensure that Newfield would follow the current UDAQ Rules as well as federal rules for controlling tanks.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Action: BLM must clarify the basis and purpose of the 20 TPY threshold, how the 20 TPY threshold was incorporated into the impact analysis, and how the 20 TPY threshold will impact the applicant's ability to pursue future offsets under a non-attainment designation for ozone in the Basin. Additionally, the time frame for implementing controls on historical tank batteries with emission greater than 20 TPY should be extended to 24 months after the applicable agency for air quality has established a functional emission credit banking system.	
Newfield	34	Pariette Wetlands ACEC	Newfield Comment: Section 3.15.1.1 states that BLM will develop a comprehensive integrated activity plan for the Pariette ACEC. According to the Record of Decision for the Castle Peak EIS which was signed in 2008, BLM committed to completing this plan in 2009. To date this plan has yet to be finalized.	Comment noted.
Newfield	35	Pariette Wetlands ACEC	Newfield Comment: Section 4.15.1.4.1 states that impacts to the Pariette ACEC under Alternative D would be similar to the Proposed Action but less extensive. Reducing similar impacts does not provide technical justification for mandating surface restrictions (i.e., establishing No Surface Occupancy restrictions) under Alternative D. Action: The DEIS (Sections 2.2, 2.3.1.1, 2.5, 2.6.1, 2.6.2, 3.15.1.1, 4.15.1.1.1, 4.15.1.4.1 and others) must be revised to reflect that Newfield may use as much of its valid existing leases as is necessary to develop all of its leased minerals in the ACEC. 43 C.F.R. § 3101.1-2.	43 CFR 3101.1-2 states that "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific nondiscretionary statues; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year." In addition, FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." Plus, NEPA requires that the lead agency evaluate all reasonable alternatives including reasonable alternatives that may not be within the jurisdiction of the lead agency, and include appropriate mitigation measures not already included in the proposed action or alternatives (40 CFR 1502.14).
Newfield	36	Soils	Newfield Comment: Section 3.5.1.2 (Soils) states the 21% of the project area are covered by soils with a wind erodibility factor of 0 tons/year. Action: Based upon these factors Newfield recommends that the impact analyses in Section 4.10.1 be revised to include a statement that impacts from fugitive dust would be negligible in 21% of the MBPA. Based upon these	The wind erodibility factor is tied to undisturbed soils. Any restrictions or buffers identified in that section are tied to potential for dust from disturbed soils.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			factors, Newfield recommends that surface restrictions as well as survey and recommended avoidance buffers be reduced in these areas.	
Newfield	37	Cactus	Newfield Comment: Section 3.10.1.2.1 (Pariette and UB hookless Cactus) references a conservative estimate of 29,000 Pariette Cactus and over 40,528 UB cactus (Total = 69,528). Currently the recovery plan population goal is 30,000 individuals. Action: As current survey and avoidance measures have resulted in the identification of over two times the goal in the recovery plan, and because there is no data that documents that current activities are negatively impacting these known populations, additional surface restrictions proposed in Alternative D (Sections 2.6.1; 2.6.2; 2.6.3) should not be implemented.	Under Alternative D, no new surface disturbance or well pad expansions would occur within Level 1 Core Conservation Areas except as allowed under the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus (see Biological Assessment – Attachment to Appendix J, Biological Opinion). Ultimately, mitigation measures for Sclerocactus will be dictated by the USFWS through the Section 7 Consultation *pro*cess.
Newfield	38	Cactus	Newfield Comment: The conservation measures listed in Section 4.10.2.3 of the DEIS are outdated and should be revised with the most updated information. Action: The following cactus conservation measures have been modified and implemented by BLM and USFWS and should be disclosed in the Section 4.10.2.3: • Section 1.B.e. is not correct. Site-specific surveys are now valid for 5-years and if construction is not conducted within one-year of the original survey, the survey area must be "spot-checked" prior to construction. • Section 1.B.e. Survey requirement have been modified for proposed pipelines which parallel existing roads. Site-specific surveys are only required on the side of the road where the pipeline will be installed (i.e., proposed ROW +300 foot buffer pipeline side only). • Section 1.B.b. has been modified. Surveys are not restricted to flowering season. Wetlandicus surveys can be conducted year-round, provide no snow cover. Brevispinus at discretion of BLM/USFWS	The EIS has been updated with the current conservation measures.
Newfield	39	Cactus	Newfield Comment: Section 4.10.2.3 (p 4-168: Item #7) states that additional mitigation measures could be implemented following finalization of the management plan for the Pariette and Uinta Basin hookless cactus. NEWFIELD believes that additional mitigation measures should only be implemented in the MBPA if it can be proven that the current measures were not adequately protecting the cacti. Action: Section 4.10.2.3 (p 4-168: Item #7) should be revised to state that additional mitigation measures would only be developed if it can be proven that current measures were not adequately protecting the cacti.	Comment noted. Ultimately all conditions of approval to protect threatened cactus will be determined by the U.S. Fish and Wildlife Service through the Endangered Species Act Section 7 Consultation.
Newfield	40	Cactus	Newfield Comment: Section 5.10.2.1 (Cumulative Impacts) Population numbers described in Section 10.5.2.1, "based on extrapolation to unsurveyed suitable habitat, the total count for the UB hookless cactus AND Pariette cactus is approximately 50,000 individuals." This is contrary to Section 3.10.1.2.1 that states that 69,528 (40,528 UB Hookless Cactus and 29,000 Pariette Cactus)	Comment noted. However, no change was made to the document as there's no supporting evidence for the proposed extrapolation.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			have already been documented. In addition, Section 5.10.2.1 states that less than 10% of potential habitat has been previously surveyed. Action: Since surveys which have only occurred on less than 10% of the known habitat for the UB and Pariette cactus have resulted in over 69,000 individuals, Newfield recommends that BLM revise Sections 3.10.1.2.1 and 10.5.2.1 to note that if extrapolated over all potential habitat that populations could exceed over 690,000 individuals.	
Newfield		Cumulative Impacts	Newfield Comment: Section 5.10.2.1 (Cumulative Impacts) states that BLM used UDOGM GIS data to determine existing surface disturbance in cactus habitat. This method is extremely flawed as multiple wells may currently be approved by UDOGM but lack Federal approval. As such, if all disturbances associated with approved UDOGM wells were assumed to be implemented, disturbance numbers would be vastly over-estimated as actions could not take place without Federal approval. In response, Spatial Energy collected and interpreted high resolution (1.5 m) imagery of Newfield's operational area on March 15, 2013. As part of this exercise existing disturbances were calculated for habitats both within the MBPA as well as for the Upper Pariette and Lower Pariette sub-population polygons that extend beyond the MBPA. Surface disturbance calculations were estimated using this methodology and these calculations need to be incorporated as baseline surface disturbance numbers throughout the EIS. Specifically, all references to baseline surface disturbances in the EIS (Section 3.10.1.2.1, 4.10.1, 4.10.2, 4.10.3, 4.10.4 and 5.10.2.1) should also be revised. The referenced tables are included in the Newfield letter which is in the administrative record for the EIS, and available for public review upon request.	Sections 3.10.1.2.1 and 5.10.2.1 have been revised with the following discussion regarding existing disturbance: The USFWS and Newfield have different methods of calculating surface disturbance. This discussion reflects both methodologies, and thus a range of existing disturbance within the Core Conservation Areas Under Newfield's assumptions, existing disturbance was determined using a custom dataset developed by Spatial Energy for Newfield based on aerial imagery analysis, which was flown annually for the MBPA between 2006 and 2013 and is referred to as "SPOT6" data. Additional information on existing disturbance was collected using a May 2014 "vendor" map that illustrates existing facilities and infrastructure within the MBPA. For portions of the Core Conservation Areas that did not have SPOT6 data or vendor map information, Newfield relied on sources such as as-built diagrams and plats from land surveyors that contain accurate information on existing facility locations and sizes. To calculate existing disturbance the USFWS assumes 5 acres of disturbance for every well.
Newfield	41	CO River Fish	Newfield Comment: Section 4.6.1.1.1.4 states that BLM's soil erosion and deposition calculations are approximations and should be regarded as accurate to within +/- 100 percent. Thus, the accuracy of these approximations is dubious and do not present a rational basis upon which BLM may justify the imposition of NSO restrictions for development within floodplain and riparian areas in the MBPA. Additionally, BLM states in Section 4.6.1.1.1.4 that "water from Pariette draw is diverted into Pariette Wetland ponds, so the project would slightly increase sediment load into the first pond. Because the flow velocity through the first pond is close to zero, suspended sediment will settle out in the first pond and not be conveyed to subsequent ponds." Based upon this determination, all sediments carried through Pariette Draw will settle in the man-made ponds and no sediment will reach the Green River. This undermines BLM's conclusion regarding the Proposed Action's impact on surface water resources and its determination in Section 4.10.1.1.1 that increased sedimentation from the Proposed Action could degrade designated critical habitat for Colorado River fish. Action: BLM's calculations (Section 4.10.1.1 – Colorado River Fish Species – p 4-127) and impact analysis should be revised to more accurately describe that sedimentation will not reach the Green River and impacts would therefore be	Thank you for your comment. We recognize that erosion and sedimentation ACEPMs are incorporated into the alternatives. However, increased sedimentation is not the only concern behind the surface use restrictions in floodplain and riparian areas. Additional concerns include contamination from spills. In addition, Pariette isn't the only potentially affected drainage in the project area, and the other drainages don't have a similar pond system. Section 4.6.1.1.1.4 edited to reflect: Water from Pariette Draw is also diverted into the Pariette Wetland ponds, so the project could slightly increase the sediment load into the first pond. Because the flow velocity through the first pond is close to zero, suspended sediment could potentially settle out in the first pond and not be conveyed to subsequent ponds. The increased load to the first pond should have a negligible effect on the pond over the LOP.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			negligible. The lack of an impact on the Green River coupled with the limited accuracy of its overall sediment and erosion impact analysis fails to provide sufficient support for proposed surface restrictions for floodplain and riparian areas (Section 2.6).	
Newfield	42	Soils	Newfield Comment: Section 4.6.1.1.1.4 also states BLM has assumed that no erosion and sediment control BMPs will be used on roads at stream crossings in determining the impact to surface water quality. This is contrary to statements in Section 4.1 that the "impact analyses are written assuming that all proposed mitigation measures will be carried forward as COAs in the ROD[.]" Action: BLM's environmental impacts analyses must be revised to reflect the mitigating impact of BMPs upon environmental resources within the MBPA.	The analyses in Chapter 4 have been edited to identify which ones considered mitigation and which ones did not.
Newfield	43	Paleo	Newfield Comment: Section 4.4.1.1 (2nd paragraph pg 4-33) does not accurately describe pre-application paleontological surveys. Action: Section 4.4.1.1 should be revised to state that when fossils are identified, the proposed well pad, pipeline or access road are re-routed to avoid all identified sites. If sub-surface paleo resources are uncovered during construction, work is halted and a mitigation plan is developed and implemented.	The FEIS has been edited as suggested.
Newfield	44	T&E Species	Newfield Comment: Section 3.10 (Special Status Species) states that 58 sensitive species were identified "as potentially occurring within the MBPA", then the next sentence states that 18 plants and 9 fish were eliminated from further analysis because either their geographic or elevational ranges were located outside of the MBPA and/or the MBPA did not provide suitable habitat. Newfield recommends the paragraph in Section 3.10 be revised to state that 31 species have the potential to occur in the MBPA and all references to the other species (i.e., 18 plants and 9 fish) be deleted from the EIS.	The FEIS has been edited as suggested.
Newfield		T&E Species	Newfield Comment: Section 4.10.1.1.1 (Colorado River Fish Species – pg. 4-127). BLM states that "Proposed Action could degrade USFWS-designated critical habitat for the Colorado River fish by increasing erosion and sediment yield". BLM goes on to state: "Conservatively assuming that all sediment delivered to Pariette Draw and other drainages within the MBPA is eventually transported to the Green River". This language is inconsistent with analyses of Surface Water Resources which states that "water from Pariette draw is diverted into Pariette Wetland ponds, so the project would slightly increase sediment load into the first pond. Because the water flow through the first pond is close to zero, suspended sediment will settle out in the first pond and will not be conveyed to subsequent ponds." Based upon this determination, all sediments carried through Pariette Draw will settle in the man-made ponds and no sediment will reach the Green River. Action: Section 4.10.1.1 – Colorado River Fish Species – pg. 4-127 and any other sections of the EIS referencing sedimentation of the Green River should be revised to reflect this data and BLM's conclusions that Newfield's development will not increase sediment into the Greene River.	No change to document. Sediment yield is still a concern because not all sediment will go into the upper reaches of Pariette. There is development anticipated downstream and in other drainage watersheds.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
Newfield	45	T&E Species	Newfield Comment: Section 3.10.2.1.6 (Sage Grouse) BLM has stated that the Utah Division of Wildlife Resources ("UDWR") has not identified priority habitat using a consistent methods. The UDWR acted as the lead technical agency in Development of the Conservation Plan for Greater Sage-grouse in Utah. As noted in the text this plan maps Preliminary Priority Habitat and Preliminary General Habitat for Sage-grouse in Utah. Neither of these habitats occur in the MBPA.	The FEIS has been edited to state: Neither of these habitats are mapped within the MBPA.
Newfield	46	Background	Newfield Comment: The legal description of the MBPA in Section 1.1 includes lands located in the Township 4 South, Ranges 1 - 3 East and Township 5 South, Ranges 1 and 2 East that are not within the MBPA. Action: These lands should be removed from the MBPA legal description.	The FEIS has been edited as suggested.
Newfield	47	Background	Newfield Comment: To better understand the current nature of the existing environment the EIS needs to include a more detailed section on current land use status of the MBPA. Specifically this section should include a brief history of oil and gas development in the MBPA, a summary of previous NEPA analyses, as well as current statistics on the number of existing well pads, roads and pipelines, the amount of existing disturbance, and the number of producing, water injection, and inactive wells in the MBPA. Specifically, Newfield encourages BLM to use the surface disturbance calculations supplied by Newfield in this comment letter.	The FEIS has been edited as suggested.
Newfield	48	Broad	Newfield Comment: Although several resource specific sections of the DEIS reference existing development/surface disturbance, no consistent methodology was used (i.e., Aerial Photography Interpretation (No Date referenced), UDOGM GIS Data, etc.).	The FEIS has been adjusted to account for corrected existing disturbance calculations which were provided by Newfield, and verified by the BLM.
Newfield	49	Broad	**Newfield Comment***:* The following resources identified in the DEIS are located outside the MBPA and are irrelevant to BLM's environmental resource analysis: • In Sections 3.6.2.2 and 4.6.1.1.1.4, BLM's references the Lower Duchesne River Wetlands Mitigation Project (LDRWMP) and Sand Wash Recreation Area neither of which is located in the MBPA. In fact, the LDRWMP is stated as lying approximately two miles north of the MBPA. This is incorrect. The LDRWMP is located approximately five miles north of the MBPA. • In Section 3.9.5, BLM references the Pelican Lake and Ouray National Wildlife Refuge that is not in the MBPA. • In Section 3.13.2.4, BLM discusses the Desolation Canyon in relation to river recreation, which is not in the MBPA but nine miles south of the MBPA. • Lastly, in Section 3.13.2.7, BLM references the Nine Mile Canyon and its associated arch sites that are located 20 miles southwest of the MBPA. **Action:** BLM should remove any and all references to the specified sites because they are not located within the MBPA and they are irrelevant to and unaffected by the infill operations being analyzed in the DEIS.	The FEIS has been edited as suggested.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
Newfield		Figures	Newfield Comment: Figure 2-2 does not accurately reflect Newfield's ability to drill all the 40 acre deep gas wells and the 40 acre and 20 acre oil wells from State and private surface locations. Action: BLM should revise Figure 2-2 to display the ability to drill all the 40 acre deep gas wells and the 40 acre and 20 acre oil wells from State and private surface locations.	The figure has been updated as suggested.
Newfield	50	Figures	Newfield Comment: Figure 2-4 displaying the development scenario of Alternative D inaccurately portrays BLM's Level 1 and Level 2 Core Conservation Areas surface restrictions as applying to State and private lands. The Figure also does not reflect Newfield's ability to directionally access federal minerals from State and fee surface locations nor does it show additional pad expansions for all 160 acre spaced well pads for further Green River oil development. Action: BLM should modify Figure 2-4 by removing the CCA surface restrictions in regards to State and private lands and include additional well pad locations on State lands to reflect Newfield's ability to extract federal minerals by directional methods. The Figure should also indicate the expansion all 160 spaced well pads to provide for additional Green River oil development.	The figure has been updated as suggested.
Newfield	51	Figures	Newfield Comment: Further, Figure 2-4 inaccurately depicts existing surface disturbance and development in certain areas resulting in the incorrect application of low-density surface spacing restrictions. Specifically, sections 25, 26 and 36 in Township 8 South, Range 15 East and sections 20 and 28 – 31 in Township 8 South, Range 16 East are all currently fully developed at 40 acre surface spacing locations and qualify as high-density areas. Action: BLM should alter Figure 2-4 to accurately portray existing surface use within the MBPA and to provide for the development of these sections consistent with all other high density areas.	The figure has been updated to reflect the changes in development assumptions for Alternative D.
Newfield	52	Figures	Newfield Comment: Proposed development scenarios displayed on Figure 2-4 and Figure 2.6-1 are not consistent. Action: Based upon the suggestions above, both figures should be revised to be consistent and to accurately display proposed development under Alternative D.	The figures have been updated as suggested.
State of Utah	1	Alternative D	In general, the state is concerned that preferred Alternative D does not meet state or federal laws to protect correlative rights and prevent waste. In addition, the drilling analysis within the DEIS does not reflect the geologic and operational realities in the planning area. Much of the proposed well pad scenarios are inconsistent with the known well density calculations. In addition, the proposed conservation actions for the Sclerocactus species presume core conservation areas and actions whose merits have yet to be vetted or proven. For these reasons, the state is concerned that the DEIS obscures potential economic losses from excessive restrictions proposed in Alternative D, and requests BLM revise the document to better inform final decision making.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
State of Utah	2	Directional and Horizontal Drilling	The DEIS states that "Recent advancements in horizontal drilling technology have increased the maximum horizontal displacement to distances of up to 2,500 feet without significant technical and economic challenges." Generalized statements such as this must be eliminated from the document. Advancements in horizontal drilling technology, and the ability to drill in a directional manner up to 2,500 feet from the vertical is not supported by current knowledge, experience, and conditions for this area. In general, directional drilling is limited by the drilling depth below the surface, the target geologic formation, resource type, pressure and recovery strategy, and economics. This recovery project, within its secondary phase, according to Utah Division of Oil, Gas, and Mining (DOGM) records, has completed 433 wells in the last three years (2011-2013), and the average horizontal offset from these directional wells was 1,168 feet, not 2500 feet	The discussion on horizontal reach has been corrected based on input from Newfield and verification from BLM's engineers.
State of Utah	3	Directional and Horizontal Drilling	The DEIS should not apply directional and horizontal drilling assumptions for future development that are not supported by current practice, technology, and economic feasibility.	The FEIS has been edited to remove any speculative language.
State of Utah	4	State Institutional Trust Lands	The DEIS should acknowledge that the special legal relationship between the United States and the State of Utah, with regard to state trust lands, imposes obligations on the United States. The United States Supreme Court has described the school land grant as a "solemn agreement" between the United States and the states to use revenues from the trust lands to educate the citizenry.	The FEIS has been edited as suggested.
State of Utah		State Institutional Trust Lands	Under Utah v. Andrus, BLM cannot deny access to SITLA's lessees to develop SITLA minerals. Nor can BLM unreasonably restrict development so as to make this development uneconomic. SITLA's lessees must be allowed access to the state school trust lands so that those lands can be developed in a manner that will provide funds for the common schools. The DEIS should be amended to acknowledge these legal principles and enable the operators within the planning area to fully develop SITLA's minerals.	The FEIS has been edited as suggested.
State of Utah	5	State Institutional Trust Lands	Each proposed alternative should recognize that where state trust lands exist, BLM is obligated to grant reasonable access as a valid existing right.	The FEIS has been edited as suggested.
State of Utah	6	State Institutional Trust Lands	All alternatives for BLM Rights-of-Ways should state that any avoidance and exclusion areas will not preclude reasonable access to state trust lands for SITLA and its lessees, subject to reasonable conservation and mitigation requirements. The DEIS should specifically recognize state school trust lands, and the uses of lessees of those lands, as valid existing rights.	The FEIS has been edited as suggested.
State of Utah	7	Alternative D	Within high density development areas for Alternative D 12 it is unclear how many wells would be allowed to be drilled from a single existing pad. The discussion states that four wells will be allowed, but only a 0.2 acre disturbance allowance is allocated. The DEIS should clarify if the allowance is for 0.2 acres for each additional well or 0.2 acres for all additional wells. Depending on current pad size, an additional 0.2 acres total will not be adequate to drill additional wells. Depending on the location of the pads in the section, pads with up to 12 wells (eight Green River oil wells and four future deep gas wells) may be necessary to adequately spot the wells, requiring a minimum four to eight acre pad. The DEIS should clarify if the two acre pad size is for drilling up to 12 wells per pad. A pad disturbed area of approximately four to eight acres would be needed depending on topography and drilling schedule. If the DEIS	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			only intended one well per pad for the Green River oil extraction, then hydrocarbon resources will be wasted, particularly where no high value environmental values have been identified,	
State of Utah	8	Figures	Figure 2.6-2 (Attachment 1) in the DEIS confuses the injection and extraction development methods used by Newfield, which is a down hole, 40 acre 5-spot pattern with 20 acre well spacing. In a unitized field, this configuration will average 16 producing wells and 16 injection wells per section. The figure should be revised to illustrate surface pads and bottom-hole locations. If well pads are assumed to be two acres in size when converted to injection wells, reclaiming 1.74 acres of the pad area may not be practical or safe. Injection wells still need to be maintained and worked throughout their lifetime which requires space for rig anchors, large trucks and tanks.	This figure has been edited based input provided by Newfield and verified by BLM's engineers.
State of Utah	9	Alternative D	Low-density development areas with no existing oil and gas wells will allow up to four new well pads per 640 acre section. It is unclear if multi-wells will be allowed on each pad. The Figure 2-4 legend states that the "proposed 160 acre spacing Green River Well Pads allows for (expansion for deep gas)." On Table 2.7-1, under Alternative D, the column for 160 acre surface density only allows for two acre surface disturbance. The DEIS should clarify if these pads can be used for multiple wells. Since much of the infrastructure to support the injection and extraction activities will already be in place and additional infrastructure will be needed for the 160 acre new well spacing, it is not unreasonable to allow the use of multi-well pads, with no limit on the number of wells per pad.	The parameters of this alternative (including the figures) were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
State of Utah	10	Alternative D	A provision to allow additional pads per section should be discussed in low-density areas, with and without development. The 1,100 foot deviations in surface and bottom-hole locations are routine in the GMBU area. However, it cannot be assumed that this deviation can be accomplished in all circumstances due to varying subsurface conditions. A vertical entry into the waterflood target zone is generally preferred for maximum sweep efficiencies. The defined unitized Green River formation in the GMBU is 1,793 feet to 6,515 feet below the surface. The ability to drill inclinations is limited by the depth and deviation of the bottom-hole location. The surface resource protection provisions proposed by Alternative D will not allow the most efficient water flood sweep, which will lessen the ultimate recovery, and thereby waste the resource	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
State of Utah	11	Alternative D	In general, Alternative D and accompanying tables and maps are unclear when discerning between the number of wells, number of pads, and associated acreages. At times the term well is used interchangeably with pad. In order to prevent waste, the number of wells should not be restricted, as long as the Board approved spacing orders are followed.	Based on the modifications to Alternative it is anticipated that the number of wells would similar to that under the Proposed Action; up to 5,750.
State of Utah	12	Cactus	Alternative D references a 5% surface disturbance density ceiling that has not yet been finalized in any final recovery plans. The 5% surface disturbance density ceiling is a new, unreferenced and unproven concept for core conservation areas. The Record of Decision for the Castle Peak and Eightmile Flat Oil and Gas Expansion Project states that a long term monitoring plan will be conducted for Sclerocactus species and will among other factors evaluate the long-term	Under Alternative D, no new surface disturbance or well pad expansions would occur within Level 1 Core Conservation Areas except as allowed under the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus (see Biological Assessment – Attachment to Appendix J, Biological Opinion). Ultimately, mitigation measures for Sclerocactus will be dictated by the USFWS through the Section 7 Consultation *process*.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			effectiveness of current conservation measures (i.e. 100 foot buffers, erosion control, surveys). A discussion of the results or ongoing preliminary results of the monitoring conducted within the Monument Butte EIS area should be used to justify increasingly restrictive conservation measures for Sclerocactus. Level 1 and 2 core conservation areas and disturbance limitations are overly excessive, and without scientific evidence of value added to the species.	
State of Utah	13	State Institutional Trust Lands	The BLM should analyze the specific economic effect on SITLA lands by virtue of establishment of the critical habitat and core conservations designations. The information used to create these areas is outdated and inapplicable to the current situation.	The requested edit is beyond the scope of this project.
State of Utah	14	Cactus	The state encourages BLM to provide flexible and reasonable options to allow for appropriate mitigation for potential impacts to Sclerocactus species to implement Alternative A. Specifically, BLM does not provide for the analysis of management choices which rely upon reasonable regulations and incentive-based conservation tools supporting the well-established biological management framework of avoid, minimize and mitigate, which are common and recognized methods to reduce potential impacts to rare plant species. The BLM should revisit the alternatives and correctly reflect impact analysis in the DEIS to include additional protective measures as viable options to consider in final decision making.	Comment noted.
State of Utah	15	Background	The DEIS should acknowledge that the Greater Monument Butte Unit is an undivided unit and that loss of development, because of restrictions and prohibitions, would impact all owners of the Unit.	The following information has been added to Chapter 1 of the FEIS: "There are approximately 75 working interest owners ranging from individuals investing their life's savings in this project to mid-size independent oil and gas companies. The GMB Unit is intended to facilitate the orderly and timely development of oil and gas resources within the unit area. The goal of unitization is to increase recovery through cooperative, unit development, and unitization matters to prevent waste and protect correlative rights. The impact of the decisions in the EIS and ultimate ROD will impact Newfield and the non-operating working interest owners. "
		State Institutional Trust Lands	The DEIS should include an analysis of the economic impacts of Alternative D to the Permanent School Fund.	Based on the edits made to Alternative D this comment is no longer applicable as the economic impacts (revenues and jobs) would be similar to the Proposed Action.
State of Utah	16	Wildlife	Utah Division of Wildlife Resources (UDWR) recommends instituting a systematic program for the construction of additional "guzzlers" (wildlife water catchments) in the area to mitigate unavoidable impacts on wildlife resulting from the new development. Guzzlers will help with the movement tendencies of pronghorns searching for water, and should reduce oil- industry vehicle I wildlife conflicts by drawing animals off of the traveled roadways. The increased supply and availability of drinking water also promotes pronghorn population resilience to the effects of drought. This mitigation approach of an area-wide guzzler program was recently used to mitigate for pronghorn disturbance described in the Greater Natural Buttes EIS. Based on areal calculations of impacted landscape compared with available pronghorn habitat and established range sizes for this species, UDWR recommends a program for siting and constructing 16 guzzlers in and adjacent to the proposed project area which would mitigate for impacts to pronghorn.	The requested measure was accepted by Newfield and added to their ACEPMs.
State of Utah	17	Reclamation	Areas which are disturbed and not properly reclaimed provide a foothold for noxious and invasive weeds. This decreases the amount of forage available for	The FEIS has been edited as suggested.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			wildlife, and exacerbates problems in controlling the spread of invasive weeds. The topsoil piles stored for future reclamation should also be monitored as it may become a seed bed and source for noxious weeds. The seed mixes used in restoration and reclamation should be appropriately formulated for different vegetation types in the planning area; this would require use of different seeds mixes as opposed to a single seed mix. UDWR staff has the expertise and is available to provide a recommendation on the most appropriate seed mixes for reclamation in the project area.	
State of Utah	18	Air Quality	The DEIS utilized a draft version of the list of voluntary seasonal controls from the Utah Division of Air Quality. This list was finalized in December 2013 and a number of the draft seasonal controls were removed because they were determined to be impractical or were already included in the enhanced inspection and ozone training recommendations. The DEIS should be modified to reflect the final voluntary seasonal ozone control measures found at: http://www.deq.utah.gov/locations/uintahbasin/additionalcontrols.htm. In developing these voluntary control measures, the Division of Air Quality recognized some measures may not always be appropriate given distinct and varying equipment designs. For this reason, the voluntary seasonal controls were intended to be a menu of options that could be used where appropriate but would not be required in all cases. The Work Practices section of the DEIS mandates these control measures be used.23 Therefore, the DEIS should be modified to allow the applicant implement these optional measures on a case by case basis rather than making them mandatory at all times.	Section 2.2.14 contains BLM Air Quality Control Measures that includes control measures to comply with UDAQ Rules as well as other control measures to include enhanced inspection and maintenance as well as work practices that have been deemed appropriate for the alternatives in the FEIS.
Monument Butte Working Interest Owners	1	Alternative D	We are very concerned about some of the surface limitations in Alternative D and how this impacts the lease rights within the project area. Buffer zones surrounding special status plant species effectively cut out certain leases, limiting the total resource capture of the unit, and potentially disrupting the Unitization agreement for certain interest owners.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary. After BLM review of the terms of the 10 BLM leases and the Unit Agreement, it has been determined that eight BLM leases are committed to the Greater Monument Butte Unit and are held by Unit production. The Greater Monument Butte Unit is a secondary recovery unit. This unit was approved by the BLM and the SITLA. In addition, the unit was approved by the Utah Board of Oil, Gas and Mining under Utah Statutes 40-6-7 and 40-6-8. All tracts have undergone compulsory unitization and are considered fully committed to the unit area. Utah Statute 40-6-8(5) explicitly provides: 5) An order providing for unit operations may be amended by an order made by the board in the same manner and subject to the same conditions as an original order providing for unit operations, provided:

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
				(a) If such an amendment affects only the rights and interests of the owners, the approval of the amendment by the owners of royalty, overriding royalty, production payments and other such interests which are free of costs shall not be required. (b) No such order of amendment shall change the percentage for the allocation of oil and gas as established for any separately owned tract by the original order, or change the percentage for allocation of cost as established for any separately owned tract by the original order In addition to this, the unit agreement does not provide for contraction or elimination of lands from the unit area. However, to technically develop these leases, Newfield has estimated that eight new multi-well pads encompassing between 6 and 50 acres of surface disturbance would be necessary in Level 1 Core Conservation Areas for Sclerocactus. These eight well pads are not evaluated in the agency preferred alternative (although they are included within the range of alternatives). Therefore, it is anticipated that under Alternative D, some undetermined amount of oil and gas resources contained within these leases, (whatever can't be reached by directional drilling from areas outside the Core 1 areas) with the attendant royalties, taxes, and other revenues, would not be realized under Alternative D.
Monument Butte Working Interest Owners	2	Alternative D	ACECs are not intended to be areas where no oil and gas development should be allowed. The Draft EIS (DEIS) does not contain any process for obtaining waivers, exceptions or modification of these conditions or restrictions that allow for operations flexibility. The Bureau of Land Management (BLM) should work with the operator and all stakeholders to find alternatives that both protect the species and allow for all partners to retain their interest in the Unit.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
Monument Butte Working Interest Owners	3	Alternative D	The leases affected by the restrictions pre-date the ACEC creation and the ACEC designation cannot retroactively and unilaterally amend the lease terms. Prohibiting or unreasonably restricting access to the leases in the Pariette Wetlands ACEC, affects our valid, existing rights to develop these leases and restricts full development of the GMBU. The leases provide the lessee with legal rights under BLM's oil and gas regulations to use as much of BLM surface as is necessary to develop the unit.	43 CFR 3101.1-2 states that "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific nondiscretionary statues; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year." In addition, FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources,

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
				including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." Plus, NEPA requires that the lead agency evaluate all reasonable alternatives including reasonable alternatives that may not be within the jurisdiction of the lead agency, and include appropriate mitigation measures not already included in the proposed action or alternatives (40 CFR 1502.14).
Monument Butte Working Interest Owners	4	Alternative D	BLM approved full field development in the interest of preventing waste and correlative rights of the lease holders as well as the government. The BLM granted leases to working interest owners knowing that the purpose of those leases was to develop the oil and gas resources. To retroactively and unilaterally attempt to restrict valid lease rights we believe is a breach by the BLM of the terms of the leases, the Unit Agreement, and the Unit Operating Agreement.	43 CFR 3101.1-2 states that "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific nondiscretionary statues; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year." In addition, FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." Plus, NEPA requires that the lead agency evaluate all reasonable alternatives including reasonable alternatives that may not be within the jurisdiction of the lead agency, and include appropriate mitigation measures not already included in the proposed action or alternatives (40 CFR 1502.14). After BLM review of the terms of the 10 BLM leases and the Unit Agreement, it has been determined that eight BLM leases are committed to the Greater Monument Butte Unit and are held by Unit production. The Greater Monument Butte Unit is a secondary recovery unit. This unit was approved by the BLM and the SITLA. In addition, the unit was approved by the Utah Board of Oil, Gas and Mining under Utah Statutes 40-6-7 and 40-6-8. All tracts have undergone compulsory unitization and are considered fully committed to the unit area. Utah Statute 40-6-8(5) explicitly provides:

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
				5) An order providing for unit operations may be amended by an order made by the board in the same manner and subject to the same conditions as an original order providing for unit operations, provided: (a) If such an amendment affects only the rights and interests of the owners, the approval of the amendment by the owners of royalty, overriding royalty, production payments and other such interests which are free of costs shall not be required. (b) No such order of amendment shall change the percentage for the allocation of oil and gas as established for any separately owned tract by the original order, or change the percentage for allocation of cost as established for any separately owned tract by the original order In addition to this, the unit agreement does not provide for contraction or elimination of lands from the unit area. However, to technically develop these leases, Newfield has estimated that eight new multi-well pads encompassing between 6 and 50 acres of surface disturbance would be necessary in Level 1 Core Conservation Areas for Sclerocactus. These eight well pads are not evaluated in the agency preferred alternative (although they are included within the range of alternatives). Therefore, it is anticipated that under Alternative D, some undetermined amount of oil and gas resources contained within these leases, (whatever can't be reached by directional drilling from areas outside the Core 1 areas) with the attendant royalties, taxes, and other revenues, would not be realized under Alternative D.
Monument Butte Working Interest Owners	5	Socioeconomics / Alternatives	There are approximately 75 working interest owners in the Monument Butte Unit. All of them have a vested interest in seeing the Unit be developed to its utmost potential. The DEIS does not analyze the socioeconomic effects of the alternatives on working interest owners.	Chapter 1 of the FEIS has been edited to include the following: "There are approximately 75 working interest owners ranging from individuals investing their life's savings in this project to mid-size independent oil and gas companies. The GMB Unit is intended to facilitate the orderly and timely development of oil and gas resources within the unit area. The goal of unitization is to increase recovery through cooperative, unit development, and unitization matters to prevent waste and protect correlative rights. The impact of the decisions in the EIS and ultimate ROD will impact Newfield and the non-operating working interest owners."
Dan Livingston	1	Transportation	The EIS should analyze transportation of crude via pipeline using electrical or gas turbine pumps.	Oil produced from the Monument Butte Unit is considered "black wax crude", which is thick and viscous and comes out of the ground at a consistency similar to petroleum jelly. Unlike so-called light, sweet crudes that can be transported by pipelines, black wax cannot be piped. Instead, waxy crudes are trucked by insulated tankers, and typically need to be heated before it can be pumped out.
Dan Livingston	2	Out of Scope	Newfield needs to pressure refineries in SLC for cleaner air.	This comment is beyond the scope of analysis.
Duchesne County	1	Alternative D	BLM identifies Alternative D as the "Resource Protection Alternative." This Project is for infill wells within a long-standing oil and natural gas field that contains extensive development and infrastructure. There are few sensitive resources within the project area, and BLM has not identified any resources that would actually be protected by scaling back Newfield's proposed infill development.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
				are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
Duchesne County	2	Alternative D	The County believes that the number of potential oil and gas wells allowed under Alternative D may be over-estimated based on inaccurate assumptions regarding the feasibility of directional drilling.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
Duchesne County	3	Directional and Horizontal Drilling	Directional drilling as proposed under Alternative D may not be economically feasible. Duchesne County recently went through a lengthy process of amending its zoning ordinance to deal with the impacts of energy development on private (fee) surface owners. During that process, Bill Barrett Corporation submitted a table showing the representative costs and other issues associated with directional drilling entitled "Wellbore Directionals." In this table: • Wellbore A is a typical vertical well. The pumping unit associated with such wells cost $120,000.00. The annual operating costs include $25,000 to $50,000 for the anticipated one work-over per year and a cost impact of less than $5.00 on each barrel of oil produced. • Wellbore B is a directional well that reaches out 700 feet horizontally from the wellbore surface location. This type of well requires a more expensive pumping unit ($180,000.00) and the annual operating costs include two to four work-overs per year resulting in estimated annual operating costs of$100,000 to $200,000 per year, with a cost impact of between $5.00 and $10.00 on each barrel of oil produced. • Wellbore C is a directional well that reaches out 1,200 feet horizontally from the wellbore surface location. This type of well requires a more expensive pumping unit ($180,000.00 or more) and the annual operating costs include four to eight work-overs per year resulting in estimated annual operating costs of $200,000 to $400,000 per year, with a cost impact of between $10.00 and $20.00 on each barrel of oil produced. Duchesne County concludes, based on the above data from energy companies operating in the Uintah Basin, that directional drilling may not be as feasible as stated by the EIS and that more energy resources in the Pariette Wetlands ACEC vicinity will be inaccessible and lost.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
Duchesne County	4	Alternative D / Socioeconomics	The socioeconomic analysis within the EIS should account for the adverse economic impacts from certain restrictions on development, such as spatial and seasonal restrictions that BLM may propose (e.g. USFWS CCAs, ACEC, winter moratorium based upon air quality concerns) and how such restrictions	Based on the substantial edits to Alternative D, which now includes a well count identical to the Proposed Action, this comment is no longer applicable.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			would negatively impact mineral development and related impacts to jobs and the local economies. These impacts include tax revenues, employment, energy prices, and royalty payments.	
Duchesne County	5	Alternative D / Socioeconomics	Alternative D would result in the loss of 692 oil and gas wells compared to the applicant's proposal. According to an August 2004 report prepared by the Utah Energy Office of the Utah Department of Natural Resources, entitled " Economic Impact Analysis of the Drilling and Completion of a Natural Gas Well in the Uintah Basin, " the drilling and completion of a single well in the Uintah Basin would create 14.8 additional jobs in Utah and $359,300 in additional personal income over a period of one year. The drilling and completion of a single well would result in net state revenue growth of $55,300 and net local revenue growth of $28,200 during that one year period. Doing the math, a reduction of 692 wells would cost Utah approximately $248,635,600 in personal income, $38,267,600 in state revenue and $19,514,400 in local revenue over the time it would take to drill and complete 692 wells.	Based on the substantial edits to Alternative D, which now includes a well count identical to the Proposed Action, this comment is no longer applicable.
Duchesne County	6	Alternative D	BLM cannot prohibit Newfield's development of its valid existing lease rights on leases that BLM issued prior to the establishment of the ACEC. These leases pre-date the ACEC's creation and the ACEC designation cannot retroactively and unilaterally amend the lease terms. BLM may not prohibit or unreasonably restrict Newfield's access to its leases in the Pariette Wetlands ACEC. Newfield has the legal right under BLM's oil and gas regulations to use as much of BLM surface as is necessary to develop it leases.	43 CFR 3101.1-2 states that "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific nondiscretionary statues; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year." In addition, FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." Plus, NEPA requires that the lead agency evaluate all reasonable alternatives including reasonable alternatives that may not be within the jurisdiction of the lead agency, and include appropriate mitigation measures not already included in the proposed action or alternatives (40 CFR 1502.14).
Duchesne County	7	Cactus	A "core conservation area" is not a defined legal term under the Endangered Species Act (ESA); rather, it is essentially a de facto creation of a "critical habitat designation" in violation of the Endangered Species Act. Under the ESA, the FWS must analyze economic impact of making a potential critical habitat designation decision. The ESA does not authorize BLM or the U.S. Fish	This comment is beyond the scope of analysis.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			and Wildlife Service to establish core conservation areas that unreasonably restrict oil and gas development on valid existing leases.	
Duchesne County	8	Alternative D	The DEIS contains extensive restrictions related to hookless cactus, buffers around tributaries to the Green River, prairie dogs and other resources. The DEIS should be amended to include these provisions for Newfield to obtain waivers, exceptions or modifications of these conditions or restrictions that allow for operations flexibility.	Exceptions, modifications, and waivers are generally developed through the land use planning process and are applied to leases. That language is not necessary for a field development project like this because additional site specific review and NEPA would occur that identify which of the measures identified in the ROD for this EIS would apply in each site specific scenario.
Duchesne County	9	Alternative D	The DEIS restricts Newfield's use of the surface in terms of 40-acre and 160-acre limits per section. These restrictions are not based on the presence of any sensitive resources (e.g., wildlife, cultural resources or sensitive species). The DEIS does not contain any rationale or justification for these surface disturbance limits.	Based on the substantial edits to Alternative D, which now includes a well count identical to the Proposed Action, this comment is no longer applicable.
Duchesne County	10	Alternative D	Alternative D in the DEIS reduces the number of authorized wells by 692 in order to decrease the project's residual surface disturbance. The proposed well reduction does not provide a reasonable basis on which to select Alternative D over Newfield's Alternative A because Alternative A would result in an increase of only 4.16% in overall residual surface disturbance within the project area.	Based on the substantial edits to Alternative D, which now includes a well count identical to the Proposed Action, this comment is no longer applicable.
Duchesne County	11	Alternative D	BLM asserts, incorrectly, that selecting Alternative D is consistent with the natural resource management objectives outlined in the Duchesne and Uintah County General Plans and the purpose of the State of Utah's Uintah Basin Energy Zone (UBEZ). The State and the Counties explicitly require that all lands within the UBEZ be developed to prioritize the full development of the underlying oil and gas resources, which cannot be achieved through Alternative D's reduced development plan.	Based on the substantial edits to Alternative D, which now includes a well count identical to the Proposed Action, this comment is no longer applicable.
Beatty & Wozniak	1	Purpose and Need	Action Requested: BLM should ensure that the full significance of Newfield's Project is explained in the Purpose and Need section of Chapter 1 of the DEIS.	The purpose and need statement is based on the lead agency's purpose and need. The following language is included in the background section of the EIS. Newfield, a private corporation, proposes development of their leases in the MBPA for the purpose of making a profit on the extraction and sale of oil and gas resources. In addition to developing the subsurface resources in the MBPA, Newfield's proposed project would increase the supply of domestic oil and natural gas and contribute to the economic vitality of local communities through increased employment opportunities and expanded tax bases. Newfield's proposed oil and natural gas development project is consistent with the Energy Policy Act of 2005 (Pub. L. No. 109-58) because it would provide a domestic source of oil and natural gas to meet rising national energy demand.
Beatty & Wozniak	2	Mitigation	Action Requested: BLM should ensure that the various mitigation measures and conditions of approval contain appropriate exception, waiver and modification criteria to maximize operational and regulatory flexibility. See Comment No. 41 and Action Requested below.	Exceptions, modifications, and waivers are generally developed through the land use planning process and are applied to leases. That language is not necessary for a field development project like this because additional site specific review and NEPA would occur that identify which of the measures identified in the ROD for this EIS would apply in each site specific scenario.
Beatty & Wozniak	3	Alternative D	Comment No. 3: BLM must revise Alternative D because it does not meet the purpose and need and is not a technically or economically feasible alternative. As detailed in Newfield's March 4 comments, Alternative D contains numerous conceptual design flaws and entirely incorrect operational assumptions. Moreover, even if these corrections are made, Alternative D remains an infeasible alternative that should not be adopted by BLM.	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Section 1.2 defines the purpose and need for the EIS to facilitate and evaluate Newfield's proposed action, and other reasonable alternatives. BLM further states that its purpose is to minimize or avoid environmental impacts, "while allowing Newfield to exercise its valid existing lease rights." DEIS at 1-2. As drafted, Alternative D does not meeting the purpose and need of the EIS because Alternative D would not authorize Newfield "to exercise its valid existing lease rights." Instead, Alternative D would prohibit development in certain areas, unreasonably constrain development, and artificially place limits on surface disturbance even though there are no sensitive resources to protect. Most importantly, Alternative D would not meet the purpose and need and allow Newfield "to exercise its valid existing lease rights" because Alternative D would prohibit development in the Pariette Wetlands ACEC and in FWS dictated Core Conservation Areas. Although Newfield provides specific comments and suggestions on Alternative D, with these unlawful "no surface occupancy" constraints on Newfield's development, Alternative D does not meet the purpose and need of the DEIS. Newfield does not support Alternative D in any way even with the specific edits that are discussed in this letter. Action Requested: BLM should not authorize Alternative D, or any aspect of Alternative D, that prohibits Newfield from reasonable access and development of all of its valid existing lease rights. BLM should authorize Alternative A.	with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.
Beatty & Wozniak	4	Alternative D	Comment No. 4: The selection of Alternative D results in substantial waste of federal oil and gas resources and this significant reduction is not justified. Many of the resource issues that result in BLM proposing essentially de facto no surface occupancy and a prohibition of new well development can be addressed in a responsible manner and with mitigation measures that will conserve resources and minimize potential resource impacts while allowing for development. . Pursuant to Section 16 of the MLA, 33 U.S.C. § 225, an oil and gas lessee is required to prevent waste of the leased minerals in order to maximize the economic benefit to the lessor. The failure to do so is grounds for lease forfeiture. Similarly, BLM's regulations regarding onshore oil and gas operations mandate that the lessee "maxim[ize] [the] ultimate economic recovery of oil and gas with minimum waste[.]" 43 C.F.R. § 3162.1(a). This statutory obligation to avoid and prevent waste is specifically incorporated into Newfield's federal oil and gas leases as well as in the BLM authorized Greater Monument Butte Unit Agreement (GMBUA) covering the lands within the MBPA. See generally BLM Form 3100-11 § 4 ("Lessee . . . must prevent unnecessary damage to, loss of, or waste of leased resources."); see also GMBUA at ¶ 15 ("Operations. . . Shall. . . provide for the most economical and efficient recovery of [oil and gas] without waste [.]").	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			It is estimated that the reduced development scenario contemplated by Alternative D will prevent Newfield from extracting approximately 47.5 million barrels of oil equivalent over the Project's duration or approximately 15 percent of GMBU's current oil and gas reserves. This amount of loss is waste, and not legally justified. The consequences of this waste are significant upon the Department of the Interior, U.S. Treasury, State of Utah, and local counties and communities. Under Alternative D, BLM and the U.S. Treasury will lose approximately $283 million in royalty revenue. Additionally, the State of Utah will be denied approximately $213 million in royalties and approximately $33 million in severance tax revenue. SITLA would also suffer a loss of over $42 million in direct revenue. Action Requested: BLM should not authorize Alternative D because it would result in a loss of federal oil and gas minerals in violation of MLA, BLM's regulations and Newfield's valid existing lease rights. Newfield urges BLM to authorize Alternative A.	
Beatty & Wozniak	5	Alternative D	Comment No. 5: Alternative D unjustifiably limits surface disturbance and mandates the use of expensive directional drilling techniques without a legal basis or other justification in the absence of any sensitive resource or potential environmental concern. As explained above, it is permissible for Newfield's operations to have significant impacts on the environment. See Robertson, 490 U.S. at 350-1. The Supreme Court has plainly stated that so long as BLM identifies and evaluates the potential adverse environmental impacts, BLM is under no obligation to avoid impacts to environmental resources. Id. Further, Newfield is authorized to use as much as the surface as is reasonably necessary to develop its valid and existing oil and gas leases, especially considering the secondary recovery operations that Newfield employs via the water flood. See 43 C.F.R. § 3101.1-2. Newfield also notes that the Project Area is a high density oil and gas field where oil and gas development has been prioritized in lieu of other resources as authorized by FLPMA. Action Requested: BLM should issue a ROD approving Alternative A (Proposed Action) or a significant portion of the development scenario in Alternative A, not Alternative D. If BLM choses Alternative D in the ROD, it must be significantly amended to account for Newfield's legal right to use as much of the surface of its valid existing lease rights to develop federally-owned oil and gas to the benefit of the U.S. taxpayers and citizens. Specifically, Alternative D reduces the number of authorized wells by 692 as compared to the Alternative A in order to decrease the Project's environmental impact (DEIS Sec. 2.6.3). This restriction is without basis from a resource perspective. It appears that BLM, along with guidance from other agencies including FWS and EPA, appears to be limiting surface disturbance for the mere fact of limiting surface disturbance. Such a restriction is unwarranted in the absence of specific sensitive resources. The result of such restrictions	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			limits and increases the costs of Newfield's development to the detriment of the United States (from a royalty perspective). Given that this is an in-fill Project of a long existing natural gas field, there is no significant difference in impacts for Alternatives A (Proposed Action) and D (BLM Preferred Alternative). In the DEIS, BLM has not explained why Alternative D (5,058 wells) is environmentally preferable to Alternative A (5,750 wells). According to the DEIS, there are currently 8,798 acres of surface disturbance within Newfield's existing oil and gas field. Under the Proposed Action, Newfield would add 3,250 new pads and 606 miles of new co-located roads and pipelines for a total of 7,204 acres of residual surface disturbance. Under Alternative D, Newfield would establish 1,743 new well pads and construct 404 miles of co-located roads and pipelines for a total of 2,394 acres of residual surface disturbance. Approval of Alternative A would result in total residual surface disturbance of 7,808 acres and Alternative D would result total residual surface disturbance of 2,818 acres. This is difference of only 4,990 acres; an increase of only 4.16% of total residual surface disturbance within a long-standing oil and natural gas field, over an area consisting of 119,743 acres. Within this context, there would not be any rational basis to approve Alternative D rather than Alternative A based on this mere 4.16% increase, particularly in light of the extensive development and infrastructure existing within the field.	
Beatty & Wozniak	6	Alternative D	Comment No. 6: The alternatives BLM analyzed in the DEIS demonstrate consideration of a range of alternatives derived from the stated purpose and need for the Project, for both BLM and Newfield, the Project proponent. Under NEPA, BLM is not required to consider in detail other alternatives. The DEIS range of alternatives far surpasses the requirements of NEPA. BLM's range of alternatives analyzed in the DEIS satisfies the legal requirements of NEPA. The range and feasibility of alternatives is derived from the stated purpose and need for the project. Thus, "[a]lternatives that do not accomplish the purpose of an action are not reasonable and need not be studied in detail by the agency." Save Our Canyons, 297 F.3d at 1031 (quoting Custer County, 256 F.3d at 1041). Action Requested: BLM should not fully analyze any additional alternatives.	Recommendation Noted.
Beatty & Wozniak	7	Alternative D	Comment No. 7: Alternative C, focusing on field-wide electrification, is not technically, legally or economically feasible. Newfield cannot implement this alternative. For BLM to be obliged to consider an alternative, the alternative must be feasible. See Vt. Yankee Nuclear Power Corp., 435 U.S. at 551; Airport Neighbors Alliance v. United States, 90 F.3d 426, 432 (10th Cir. 1996). Thus, NEPA "does not . . . require agencies to analyze the environmental consequences of alternatives it has in good faith	Alternative C has been modified to identify the additional costs of electrification and larger ROWs. The potential for Newfield to abandon the project and the subsequent loss of potential revenue and jobs from oil and gas development has been disclosed in the socioeconomic analysis.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			rejected as too remote, speculative, . . . impractical or ineffective." Custer County, 256 F.3d at 1039 (citing Colo. Envtl. Coal. v. Dombeck, 185 F.3d 1162, 1174 (10th Cir. 1999)). Newfield assessed the possibility of a phased field-wide electrification system over a 7- year period and determined that it would be complete cost prohibitive and, if implemented, would preclude any further development within the Monument Butte Field. In other words, electrification would render the entire project uneconomic. Similarly, electrification is not technically feasible. The power demands of the field for this electrification alternative would exceed the current capacity of the Bonanza Coal Fired Power Plant. As a result, Newfield would be required to construction its own electric generation facilities. Newfield estimated the lifetime cost of self-generation at $600 million each for 11 generation stations, including distribution systems but excluding on-drill pad electrification costs and fuel value. The aggregate costs would exceed $1.4 million per well. This cost alone is more than the current development cost per well and would render Green River wells completely uneconomic. Moreover, even if it were technically feasible, electrification would result in tremendous additional surface disturbance due to the extensive rights-of-way that would be needed to deliver electricity to the field. Action Requested: Newfield urges BLM to not adopt components of Alternative C or otherwise incorporate components of Alternative C into its final preferred alternative.	
Beatty & Wozniak	8	Socioeconomics	Comment No. 8: A socio-economic impact analysis is used to assess the social and economic consequences of implementing the various alternatives identified through the planning process. The impact analysis must also include recent and verifiable income and employment for various economic sectors, community infrastructure, state and local revenues and expenditures, and land use patterns. Mineral development plays a large role in the local economic growth and opportunity for Duchesne and Uintah Counties. For example, as discussed above, under Alternative D, BLM and the U.S. taxpayer will lose approximately $466,560,250 in royalty revenue. Additionally, the State of Utah will be denied approximately $30,508,500 in royalty payments and another $33,570,600 in severance tax revenue. Action Requested: The socio-economic analysis within the EIS should qualitatively account for the adverse economic impacts from certain restrictions on development, such as seasonal restrictions that BLM may propose (e.g. winter moratorium based upon air quality concerns) and how such restrictions would negatively impact mineral development, and related impacts to jobs and the local economies. These impacts include tax revenues, employment, energy prices and royalty payments.	Based on the substantial edits to Alternative D and the fact that well counts under the Alternative would be identical to the Proposed Action this comment is no longer applicable.
Beatty & Wozniak	9	Air Quality	Comment No. 9: During finalization of the EIS, it is important to keep BLM's role with regard to air quality within proper context under NEPA and BLM's	The air quality modeling and mitigation strategy proposed has been vetted through the BLM Utah Air Resource Advisory Group (RTAG), which includes Federal land managers, EPA, and the

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			decision-making. BLM must analyze and disclose impacts to air and other resources in NEPA documents, but is not the regulating agency to ensure that oil and gas operations comply with the CAA. Under the CAA, each state has the primary responsibility for assuring air quality within non-tribal areas of the state. 42 U.S.C. § 7407. UDAQ has primary jurisdiction on BLM lands. EPA has primary responsibility for areas within the tribal airshed, although EPA has not yet developed a minor source permit program for regulated activities within Indian airshed. BLM does not have the statutory or regulatory authority to regulate air quality or enforce air quality laws. Within the NEPA context, however, air quality analysis is a matter of special expertise where reviewing tribunals show the most deference to agencies conducting the analysis. See, e.g., Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 377 (1989). Records of Decision for NEPA documents do not themselves authorize any activity capable of emitting air pollutants. Companies must obtain a permit and authorization from UDAQ or EPA before constructing any regulated emission source that is analyzed in the NEPA document, and must comply with applicable air regulations once operations commence Applications for Permits to Drill (APD) are issued with conditions of approval that require operators comply with all applicable laws, but the BLM is not legally authorized to regulate air quality standards. It is the responsibility of EPA or UDAQ to issue air permits for oil and gas operations and to ensure that operators comply with those permits and the CAA. BLM must analyze and disclose impacts to air and other resources in NEPA documents, but is not the regulating agency that ensures that oil and gas operations comply with the Clean Air Act. The BLM does not have jurisdiction to regulate air quality standards; and, NEPA cannot be used as a surrogate for the CAA. At bottom, to fulfill its legal obligations under NEPA and FLPMA, the BLM must analyze and disclose impacts to air and other resources in NEPA documents. BLM, however, is not the regulating agency to ensure that oil and gas operations comply with the CAA. Any alleged flaws in BLM's air quality analysis must be reviewed within the context of the purposes of NEPA (informed agency decision-making and public participating), as well as other state and federal agencies' responsibilities to ensure compliance with the CAA. BLM must analyze and disclose impacts to air and other resources in NEPA documents, but is not the regulating agency to ensure that oil and gas operations comply with the CAA. Prior to development, Newfield must obtain a permit and authorization from UDAQ before constructing any regulated emission source that is analyzed in the EIS. Moreover, BLM can assume and inform the public that the UDAQ will ensure that air quality standards are and will be met throughout the life of the Project. BLM will issue APDs with conditions of approval that require Newfield to comply with all applicable laws. BLM is not legally authorized to regulate air quality standards and it is the responsibility of the State of Utah to issue air	Utah Division of Air Quality. The procedures used to review the modeling and mitigation strategy are found in the Memorandum of Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act Process (2011). BLM acknowledges that EPA and Utah are the regulatory agencies for air quality in the Uinta Basin.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			permits for oil and gas operations and to ensure that operators comply with those permits and the CAA. Action Requested: BLM should emphasize in the DEIS the purpose of NEPA in the context of air quality impact analysis. The public, especially, must understand that air quality regulations fall under the jurisdiction of the State of Utah, and the EPA, and that BLM's role is to analyze potential impacts to ensure that the decision-making process is well informed.	
Beatty & Wozniak	10	Air Quality	Comment No. 10: In the air context, as project operator, Newfield must comply with all applicable state and federal air statutes, regulations and emission standards applicable in the Uinta Basin. The DEIS recognizes that compliance with all federal and state air laws and regulation is an obligation agreed to by the project proponent. It is important to acknowledge and recognize, and the EIS should explain, that in the event federal air standards change in the future, the project proponent will be unable to obtain necessary air permits for the Project unless the emissions from the Project meet those regulatory obligations. In most cases, air emission regulations are based on the National Ambient Air Quality Standards (NAAQS) developed by the EPA. Should the ambient air pollutant levels exceed these standards, then all operators within the affected area must reduce emissions accordingly to move the area back toward compliance with the NAAQS. As explained previously, while the DEIS NEPA analysis requires review of potential air impacts, NEPA is not the regulatory vehicle by which air emissions are addressed, and project approval under NEPA is not prohibited even if significant impacts are anticipated. Instead, air impacts are addressed and minimized by the mitigation and applicant-committed measures incorporated into the final EIS, and by requiring and ensuring full compliance with federal and state air emission laws and regulations. Action Requested: The final EIS should more clearly emphasize and explain the regulatory programs applicable to this Project and re-emphasize that all actions of the applicant in operating the Project will be subject to certain environmental regulations. Newfield has committed to full compliance with these regulations. It is important that the final EIS re-emphasize that the EPA and the State of Utah—not the BLM—under authority granted by Congress in the CAA, will be ensuring that the Project meets existing and future air quality requirements via permitting for construction of new facilities that require air permits. Finally, the EIS should explain that BLM consulted fully with EPA and the RTAG, as well as the State of Utah DAQ, regarding air quality analyses and potential mitigation measures.	The air quality modeling and mitigation strategy proposed has been vetted through the BLM Utah Air Resource Advisory Group (RTAG), which includes Federal land managers, EPA, and the Utah Division of Air Quality. The procedures used to review the modeling and mitigation strategy are found in the Memorandum of Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act Process (2011). BLM acknowledges that EPA and Utah are the regulatory agencies for air quality in the Uinta Basin.
Beatty & Wozniak	11	Air Quality	Comment No. 11: It is the applicant, Newfield, who commits to Applicant Committed Environmental Protection Measures (ACEPMs). These applicant measures are not prescribed by BLM or the EPA. In this case, however, certain provisions have been added to Newfield's ACEPMs without prior consultation	Edit to 2.2.12.1.2 text to specify that oil wells are not included and the mitigation only applies to high-pressure gas wells. Also removed the options to store or re-inject recovered liquids and route recovered gas to a gas well during completion.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			with or acceptance by Newfield. Most of the added provisions in the DEIS are feasible, reasonable, and acceptable to Newfield, with the exception of a few caveats and questions detailed below. Action Requested: Any measures required by BLM and not proposed or otherwise agreed to by Newfield should not be included as ACEPMs. Any measures to be imposed on Newfield that were not proposed or agreed to in advance should be included in, and be analyzed as part of, the agency preferred alternative—they are not ACEPMs. 1. Section 2.2.12.1.2 - Drilling/Completion Operations a. NSPS Subpart OOOO (Quad O) generally does not apply to oil well completions because emissions from oil wells is minimal and the resulting cost would be indefensible	
Beatty & Wozniak	12	Air Quality	Comment No. 12: Under the second bullet of Section 2.2.12.1.2, BLM added significant additional obligations to the existing ACEPMs including the requirements that Newfield route saleable quality gas to a flow line and Newfield's capture and route captured gas to combustion devices, among other requirements. It is not clear in the current language of the ACEPM if BLM intended that these additional requirements pertain to only high pressure gas wells, or also include oil wells. At first glance, these additional requirements appear similar to obligations imposed on new and reworked gas wells under the NSPS Quad O regulations. 40 C.F.R. Part 60 Subpart OOOO. BLM must explain the basis for applying these requirements to oil wells, if that was the intent, as well as the anticipated benefit, because when the EPA promulgated Quad O it acknowledged that gas emissions from oil wells generally was not only negligible, the cost of capturing such emissions compared to the benefit achieved in terms of decreased emission would be grossly disproportional to the point of being arbitrary and capricious. When EPA promulgated Quad O, it specifically stated that oil wells (wells drilled principally for the production of crude oil) are not subject to this rule. 77 Fed. Reg. 49,492. The agency explained that its data showed that the magnitude of ongoing VOC emissions from a producing gas well is approximately 2.6 tons per year (TPY) or about 14 pounds per day, while the magnitude of VOC emissions during a gas well completion following refracturing is 23 tons over an average period of 7 days, or about 6,600 pounds per day. 77 Fed. Reg. 49512 n. 15. By comparison, as shown on page 4–13 on Table 4.4 -- Nationwide Baseline Emissions from Uncontrolled Oil and Gas Well Completions and Recompletions -- of the Quad O rulemaking Technical Support Document (TSD), there are only about 134 TPY of VOC emissions from oil well completions and recompletions for the entire United States. 77 Fed. Reg. 49,516.	Edit to 2.2.12.1.2 text to specify that oil wells are not included and the mitigation only applies to high-pressure gas wells. Also removed the options to store or re-inject recovered liquids and route recovered gas to a gas well during completion.

<table>
<tr><th colspan="5">Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS</th></tr>
<tr><th>Commenter</th><th>Comment #</th><th>Topic / Resource</th><th>Public Comment*</th><th>BLM Response</th></tr>
<tr><td></td><td></td><td></td><td>Ultimately, the EPA determined that based on available data, and a cost/benefit analysis finding that the cost per pound of VOC emissions reductions from oil wells would be excessive, the agency did not apply Quad O to oil wells. As such, it is confusing why BLM would do so in the Newfield DEIS.

Action Requested: These requirements should be removed and not be imposed upon oil wells

b. The reporting of flowback emissions under the GHG reporting rule is not applicable to oil wells.</td><td></td></tr>
<tr><td>Beatty & Wozniak</td><td>13</td><td>Air Quality</td><td>Comment No. 13: In addition to the concern expressed above, provisions in this revised ACEPM addressing flowback emissions may be interpreted to be inclusive of low pressure black wax oil wells. For reasons similar to those resulting in the exclusion of oil wells from Quad O, the reporting of flowback emissions for Green House Gas (GHG) purposes only applies to gas wells by rule. The EPA specifically excluded oil wells from the flowback reporting under the GHG reporting rule.

While Newfield has addressed this issue in its technical comments, it is worth repeating that, if it was BLM's intent for this ACEPM to apply to flowback from oil wells, the requirement would appear to have little practical value and is not consistent with existing EPA rules.

Action Requested: This "applicant committed measure" must be removed from the Final EIS. It is neither cost effective nor will it result in measurable air emission reductions.</td><td>Edit to 2.2.12.1.2 text to specify that oil wells are not included and the mitigation only applies to high-pressure gas wells. Also removed the options to store or re-inject recovered liquids and route recovered gas to a gas well during completion.</td></tr>
<tr><td>Beatty & Wozniak</td><td>14</td><td>Air Quality</td><td>Comment No. 14: Under the fifth bullet point addressing the installation of controls with an efficiency of 95%, BLM applies this limit to "all other tanks with the potential to emit greater than 20 TPY." There is no explanation as to how BLM arrived at this 20 TPY criteria, or whether the 20 TPY criteria will apply to single tanks, tank batteries or something broader. BLM must clarify the basis and scope of the 20 TPY criteria.

Additionally, since this is ostensibly an applicant committed measure, we presume that the 95% control efficiency requirement applicable to all tanks with the Potential To Emit (PTE) 20 TPY was incorporated into the analysis of all potential air quality impacts. If so, we ask BLM to provide confirmation of the fact and document the related benefits, and if not then we ask BLM to clarify how this measure will be incorporated into the analysis of impacts.

Finally, BLM must explain how compliance with this imposed ACEPM will be documented so as to allow Newfield the opportunity to convert these voluntary emission reductions to offsets if, or once, the Basin is designated as non-attainment and a formal offset program is established. As explained in Newfield's technical comments, by taking this early action to control stock tanks with emissions greater than 20 TPY that are not otherwise obligated by existing regulations, Newfield would in effect be forfeiting potentially</td><td>Edit to document made by removing tank control ACEPM for all tanks over 20 tpy. The ACEPM regarding Quad O applicable tanks being controlled if over 6 tpy has been left in.

A new BLM mitigation in 2.2.14 was added such that "Newfield would comply with the applicable requirements of UDAQ Rule 307-401-8a as they apply to the installation of Best Available Control Technology (BACT) compliant emission controls on tanks which requires the degree of pollution control for emissions to be at least best available control technology. When determining best available control technology for a new or modified source in an ozone nonattainment or maintenance area that will emit volatile organic compounds or nitrogen oxides, best available control technology shall be at least as stringent as any Control Technique Guidance document that has been published by EPA that is applicable to the source."
This new BLM mitigation would ensure that Newfield would follow the current UDAQ Rules as well as federal rules for controlling tanks.</td></tr>
</table>

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			significant opportunities to generate emission reduction credits that would be critical to the future operation and development of the Unit. If BLM has not considered this issue, or is unclear whether the reductions required by this ACEPM will be considered 'voluntary' for purposes of a future offset program, then it should so state and consider rescinding this element of the applicant committed measures. Action Requested: BLM should remove this requirement. In the event BLM keeps this measure, BLM must clarify the basis and purpose of the 20 TPY threshold, and how the 20 TPY threshold was incorporated into the impact analysis. Additionally, the time frame for implementing controls on historical tank batteries with emission greater than 20 TPY should be extended to 24 months after the applicable jurisdictional agency for regulating air quality has established a functional emission credit banking system.	
Beatty & Wozniak	15	Air Quality	Section 2.2.12.1.3 - Production Operations Comment No. 15: Under the first bullet point, BLM adds the requirement that "[i]ntermittent pneumatic devices will be operated such that average emissions are not greater than for a low bleed device." Again, the project proponent did not, and cannot, commit to this requirement because it is impossible to comply with and impossible to demonstrate compliance with. We ask BLM to explain the basis for this requirement, and explain how an intermittent pneumatic device can be operated in a manner that will result in emissions equivalent to a low bleed device. As explained in Newfield's technical comments, there are two basic types of pneumatic controllers: continuous bleed and intermittent bleed. Continuous bleed devices utilize a constantly flowing stream of gas which is vented through a small nozzle to the atmosphere. Continuous bleed devices with a flow rate of 6 scf/hour or greater are considered to be high bleed, while devices which flow less than 6 scf/hr are categorized as low bleed. In contrast to continuous bleed devices, intermittent controllers do not constantly vent, but instead utilize an actuator and valve system that is normally closed. When action of the intermittent controller is required, gas contained within the actuator is utilized and then released to the atmosphere. The device actuator is sized according to the duty it must perform. Furthermore, there are no service adjustments accessible to the operator to control the venting from intermittent devices. Thus the vent rate of intermittent devices is regulated by the number of times they are actuated during the course of the day. There is no practical means to count or otherwise determine the number of times each one of these intermittent devices is actuated during the course of the day and thereby demonstrate average emission rates no greater than low bleed devices. In addition, there are no practical means by which an operator can regulate emissions from	Edit made so that ACEPM does not mention the operation of intermittent bleed devices, in alignment with NSPS Subpart OOOO. Intermittent bleed devices are still included in the ACEPMs as devices that can be used to minimize VOC emissions however.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			intermittent devices other than shutting in the well and ceasing operation. To limit the number of time a device activates in the day is to effectively prevent the device from performing its intended function. In addition to the practical limitations explained in Newfield's technical comments, the existing Greenhouse Gas Reporting Program rule, 40 C.F.R. Part 98, Subpart W, Table W-1A recognizes that this requirement is neither feasible nor defensible. Within the onshore petroleum and natural gas production category in the Western United States, low bleed pneumatic devices have an emission factor of 1.39 scf/hour, while intermittent bleed pneumatic devices have an emission factor of 13.5 scf/hour. 40 C.F.R. 98 (Table W-1A). Short of turning the device off for extended periods, it is unclear how this provision can be achieved. Action Requested: The "applicant committed measure" concerning the operation of intermittent pneumatic devices must be removed from the Final EIS because it is impossible to comply with and impossible to prove compliance with. The replacement requirement should be reworded so it is fully consistent with the requirements of the Quad O regulations. Under the second bullet, BLM added the requirement that high-bleed pneumatics would be replaced no later than six months after the ROD if finalized. If this provision is to be incorporated into the EIS, it should be crafted in manner that is fully-consistent with the requirements and language of NSPS Subpart OOOO—including provisions related to timing of replacement and exceptions for safety.	
Beatty & Wozniak	16		Monitoring Programs Comment No. 16: The second bullet point requires thief hatch inspections to be conducted annually. While this time frame is consistent with Utah DAQ AVO inspection guidelines, the scope of the obligation should be clarified to apply to tanks with controls, not all tanks. Action: This ACEPM should be revised accordingly. Again, BLM's decision to add provisions to the list of agreed-upon applicant committed measures without consulting the applicant is unusual and inconsistent with NEPA regulations. Regardless, for the provisions outlined above, BLM must recognize that certain of the provisions should be reconsidered and removed.	There was no edit to document made. The inspection of thief hatches from controlled and uncontrolled tanks remains for additional control of VOC emissions.
Beatty & Wozniak	17	Air Quality	Background Ambient Levels Comment No. 17: As with previous NEPA analyses of oil and gas projects in the Uinta Basin, the DEIS needs to be revised to clarify and put into proper context certain criteria pollutant background concentration figures included in the DEIS. Specifically, in the DEIS at page 3-9, BLM lists the pre-project ambient area ozone concentration in the Basin as .094 parts per million (ppm). This figure is, at best, misleading and confusing. Those reviewing this document must understand that this is not a Design Value, but is instead the average of certain non-regulatory monitoring data.	BLM recognizes that monitoring data are not use to make a non-attainment or non-compliance determinations. As such the following text added to Page 3-8: "The background values presented in Table 3.2.3.2-1 are not equivalent to an EPA determination for non-compliance or non-attainment of the NAAQS but rather an analysis of monitoring data to represent the MBPA for purposes of this EIS."

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Initially, the DEIS needs to be revised to explain the difference between this “background value,” which is based—at least in part—on non-regulatory data rejected by EPA in its designation of the Uinta Basin as unclassifiable for compliance with the federal ozone NAAQS, and “design values” which are developed for purposes of determining if a given area is in compliance with the NAAQS. To determine the regulatory “design value” for ozone compliance, for instance, EPA is required by law to review quality assured regulatory data to determine the three-year calendar- year average of the fourth highest daily maximum eight-hour average ozone concentrations measured at relevant regulatory monitors. 40 C.F.R. § 50.15 (2008). If that fourth-highest average is greater than the NAAQS (.075 ppm), then the area will be deemed not to be in compliance with the NAAQS. In fact, in responding to petitions for administrative review and lawsuits challenging certain area ozone designations recently, EPA specifically rejected the use of data from non- regulatory monitors in the Basin for regulatory decisions under the CAA because the data could not be considered quality assured. See EPA Responses to Significant Comments on the State and Tribal Designation Recommendations for the 2008 Ozone NAAQS (RTC), Docket No. EPA- HQ-OAR-2008-0476, 72-74 (April 2012). As explained by EPA, in order to be considered quality-assured regulatory data, the data must meet the requirements of 40 C.F.R. Part 58. Id. at 74. Among the other requirements of Part 58, for data to be considered regulatory the monitoring stations must have a Quality Assurance Project Plan (QAPP) in place that meets EPA requirements. Id. at 73, 40 C.F.R. Part 58, App. A (2.1). No such plan was approved for the Redwash or Ouray monitoring stations in the Basin until 2012, and the lack of an approved QAPP resulted in EPA’s rejection of the data from the two monitors. Id. at 73. In defending its designation of the Uinta Basin as unclassifiable, EPA further clarified its position in its Administrative Response to a challenge to the designation that, in fact, none of them are appropriate for designation purposes. Specifically, the Agency stated: For the Uinta Basin monitors, biweekly [Quality Control] check data and daily span check data are available in the AQS [database] for August 2009 through January 2010, [but] no independent multi-point audit data are available. Without complete records of both types of quality assurance data the data cannot be considered quality assured. The petitioners’ assumption that the EPA did not use the data for designations because of a lack of certification of the 2011 data is incorrect; rather, the EPA does not consider the data appropriate for designation purposes because it does not meet the criteria for quality assurance.	

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			EPA Denial of SUWA Administrative Appeal (Dec. 14, 2012), at § V (available at http://www.epa.gov/airquality/ozonepollution/designations/2008standards/petition/respEarthJusti ce.pdf). In stark contrast, the background ozone value referenced in the DEIS is based on data from two monitoring stations—both of which were determined by EPA to be non-regulatory monitors prior to 2012—and it only partial-year data sets were considered for winter months when ozone concentration levels are generally at their highest. BLM's mandate under NEPA is to use the best-available scientific data for its analyses. When such data, as here, is flawed, BLM must explain these deficiencies in the EIS to fully inform the public on the limitations of such data and the basis for BLM's decision-making related to this data (e.g., while background values may be incomplete or not quality assured, BLM consulted with the State of Utah DAQ and EPA, and has sufficient information for purposes of informing potential air emission mitigation measures for the Project). Newfield recognizes that ozone levels in the Basin may be high under select conditions in the winter months, and that EPA and the State of Utah may eventually revise the air quality regulations applicable to operators in the Basin in order to decrease levels of certain criteria pollutants. When this occurs, Newfield has already committed in this DEIS to fully comply with those revised standards. Action Requested: BLM must fully explain that the background data provided in the DEIS is not equivalent to an EPA determination of non-compliance with a given NAAQS and that EPA has determined that the data from these monitors during this time period is not quality assured and not viable for use as a regulatory design value upon which NAAQS compliance decisions are based.	
Beatty & Wozniak	18	Air Quality	Seasonal and Annual Background Levels Comment No. 18: In addition to providing a clearer explanation in both the TSD and the DEIS as to the basis for the background ozone level provided in tables 3.2.3.2-1 (DEIS) and 3.2 (TSD), Newfield requests that BLM provide both an annual and a winter-seasonal ozone value for each of the years currently covered by the respective tables. Explaining in the text of section 3.2.3.2 or incorporating both values in the table, even though the data on which the values will be determined remain primarily of a non-regulatory, non-quality assured nature, will help to clarify the fact that the ozone issue in the Uinta Basin is primarily a winter-time issue. Ultimately, presenting both winter-seasonal and annual background levels for ozone in the DEIS will provide the decision-maker with important relevant information, given that the DEIS explains in significant detail that scientific understanding as to the cause of winter-time ozone is not yet fully understood.	Text added to Page 3-9: "Figure 3.2.3.2-1 displays daily maximum 8-hour ozone data from the Ouray monitor location in 2013 (USEPA 2014). The data show exceedances of ozone only in the winter months (January – March and December), thus for the majority of the year, the ozone data is below the NAAQS of 0.075 ppm." Figure 3.2.3.2-1 also added showing yearly ozone data.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			These values will also help inform the public that the ozone issue in the Basin is not uniform over the course of a given year so there would be little value in requiring additional controls in the non-winter months when the ozone levels are generally much lower. Action Requested: BLM should provide seasonal background values for ozone in both the TSD and the DEIS to show the variability in ozone levels in the Basin during the various seasons.	
Beatty & Wozniak	19	Air Quality	Air Impact Modeling of the Alternatives Comment No. 19: BLM determined modeling of each alternative was unnecessary; we defer to agency expertise on this decision. Newfield agrees that due to the relatively minor differences between the alternatives, additional modeling would not provide additional substantive information to decision makers because impacts and differences between project alternatives are entirely minimal and inconsequential from a modeling perspective. As explained in the DEIS TSD, Section 5, while alternatives A and C were modeled for a variety of near-field impact scenarios, only alternative A was modeled for far field impact evaluation. The alternative has the largest emission of any of the alternatives and thus yields the maximum impact of any of the alternatives. TSD at 55. Action Requested: No action is required. BLM has publically disclosed the impacts of the alternative with the largest potential impacts. Impacts from the other alternatives will be less than the modeled impacts. Additional modeling would simply be redundant and not further inform BLM decision-making related to air quality and related potential mitigation measures.	Comment noted. Additionally, Alternative A was modeled using the ARMS model platform between the DEIS and FEIS.
Beatty & Wozniak	20	Air Quality	Additional Air Impact Modeling - Timing Comment No. 20: The DEIS states that additional “modeling will be conducted . . . within one year of the ROD, or one year of the BLM ARMS modeling platform becoming available, whichever is first.” DEIS at 2-29. The “whichever is first” proviso creates a potential conflict in the event the ARMS platform or the Monument Butte ROD are delayed. Action Requested: Newfield requests that the “or” in this proviso be replaced with “and,” and that the “whichever is first” language be struck. This will allow additional modeling to move forward once both elements are completed to ensure that modeling is completed with the new ARMS platform. BLM should revise the language in this requirement accordingly.	The referenced statement was removed from the FEIS. The ARMS modeling platform became available between the DEIS and FEIS and project specific ARMS modeling was conducted. The results for ozone from the project specific ARMS model are summarized in Chapter 4, Section 4.2.1.1.5 of the FEIS.
Beatty & Wozniak	21	Air Quality	Adaptive Management Comment No. 21: Newfield recognizes the need for and value of an adaptive management approach to provide BLM with necessary regulatory flexibility. However, the discussion of adaptive management options in DEIS Section 2.2.11 incorporates out-of-date guidance and needs to be updated to reflect the current guidance from the State of Utah (available on the State of Utah’s website).	Document edited to incorporate the most updated adaptive management strategy language and includes work practices based on current UDAQ guidance and rules.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Additionally, we urge the BLM to recognize that some alternative work practices that may be useful and productive in the summer cannot be applied in the winter in Utah. For instance, cold conditions necessitate the operation of dehydrators at optimal rates to prevent lines from freezing. Arbitrarily reducing glycol circulation rates during freezing temperatures may result in unnecessary line freeze-ups which could potentially shut-down large sections of fuel gas lines. The potential real-world repercussions of certain suggested management techniques must be weighed. Action Requested: BLM must update the adaptive management provisions to reflect current guidance, and must confer with Newfield to determine whether certain delineated management provisions are practical.	
Beatty & Wozniak	22	Air Quality	Adaptive Management - Retroactive Application of Management Measures Comment No. 22: Newfield also calls to the BLM's attention the statement on page 69 of the DEIS TSD that VOC controls and seasonal response plans are the most promising avenues at this time to address winter ozone. BLM goes on to state that the list of enhanced seasonal measures directed toward ozone precursor emissions will be retroactively applied to other recent oil and gas projects analyzed pursuant to NEPA in the Basin that also contain adaptive management requirements. Action Requested: BLM must explain the basis for its legal authority to retroactively amend previously issued project-level Records of Decision, and impose measures retroactively without consulting these operators in the Uinta Basin that have already completed the NEPA process.	Comment noted. For clarification, recently completed ROD's in the Uinta Basin that have Adaptive Management requirements include provisions for retroactively adopting enhanced control measures once these have been identified by BLM. The ROD for Monument Butte has no bearing on these requirements for other ROD's. The referenced sentence has been deleted since retroactive application of air quality adaptive management to other NEPA projects is beyond the scope of this document and its ROD. Additionally, the statement regarding VOC controls and seasonal response has since been removed from the AQTSD as this statement was in previous versions of the adaptive management language. The current version of the adaptive management language is in Section 2.2.11 of the EIS and this section is referenced by the AQTSD.
Beatty & Wozniak	23	Air Quality	Visibility Impacts and Regional Haze Modeling Comment No. 23: A more thorough explanation of the regional haze modeling results in the DEIS is necessary. BLM must explain that a different methodology was used for this analysis as compared to prior NEPA analyses for projects in the Basin that have recently been authorized. As such, the visibility impacts suggested in this DEIS cannot be directly compared to the impacts suggested in prior project level EISs within the Uinta Basin. According the DEIS TSD, the change in deciviews for this Project in nearby sensitive areas was evaluated using CALPUFF Method 8 and the regional haze equations suggested by FLAG in 2010 guidance. TSD at 54. Action Requested: The reason for employing a different regional haze modeling method, and the general details of this method, must be explained in the EIS in relation to previous regional haze impact analysis conducted in recent NEPA documents in the Uinta Basin. For the reviewing public in particular, it is important to explain how the data generated by this method can or cannot be used to compare impacts from previously-approved projects in the same area.	The comment is correct that a new method was used to model potential regional haze impacts. The following language will be added after the first sentence in the paragraph immediately preceding Table 4.2.1.1.4-2: Method 8 and the revised IMPROVE equations for evaluating regional haze impacts have not been previously used in Environmental Impact Statements for oil and gas projects in Utah and thus the results using Method 8 cannot be compared to previous Impact Statements. The new method separately evaluates small and large particles and uses different relative extinction values for the various species of particles that could affect light extinction than used in previous methods. This method was chosen because the Federal Land Managers recently suggested its use over previous methods.
Beatty & Wozniak	24	Air Quality	Visibility Impacts - Comparison to PSD increments	The comment is noted and the following language will be added after the third sentence of the first paragraph in Section 4.2.1.1.4: PSD increments were established by the Federal Clean Air

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Comment No. 24: The BLM should explain for a lay audience the significance of the data analysis presented in tables in both TSD section 5 and DEIS Section IV in which modeling results are compared to PSD increments. See e.g. DEIS at 4-13. The tables provide a comparison between the maximum far-field visibility impact modeling results for multiple criteria pollutants at certain Class I and Class II areas and the applicable CAA PSD increments. However, BLM fails to fully explain the significance of the data. In essence, the table shows that the maximum modeled impacts come nowhere near the PSD increments authorized under the CAA for various criteria pollutants. This is an important fact that should be presented in narrative form in the text of this section in addition to the numerical representation in the tables. Action Requested: The results of the comparison must be more clearly explained in narrative.	Act to prevent significant deterioration of air quality, especially in areas such as National Parks and Wilderness Areas. If the potential impact of an operation in an area is less than the PSD increments, then, according to the Federal Clean Air Act, significant deterioration of the air quality in that region will not occur with respect to the averaging times and pollutants for which PSD increments have been established. However, impacts with respect to PSD increments is a regulatory process, and thus comparison to increments is provided herein as a point of information only. In addition, the following language will be added after the first sentence in the second paragraph of Section 4.2.1.1.4: The potential impacts of the project are much less than the PSD increments.
Beatty & Wozniak	25	Air Quality	Greenhouse Gas Emission Analysis Comment No. 25: Finally in the air quality context, BLM's analysis of greenhouse gas emission data in the DEIS may warrant review and clarification. For instance, Table 4.2.1.1.1-1-1 in the DEIS provides that the "project total" for CO2 emissions from both oil and gas wells from the Project are 2,830,600 TPY of CO2. While this analysis may be accurate, Newfield notes that greenhouse gas reporting is normally presented in metric tons per year (MTPY) as opposed to TPY, and reporting is also often presented as "CO2 equivalents" rather than simply as "CO2." Action Requested: BLM should clarify that the terminology and reporting units in the DEIS are accurate.	Table 4.2.1.1.1-1 and similar tables are labeled in terms of tons per year. The table also separately reports emissions of CO2 (not CO2 equivalent), N20, CH4, and GWP (Global Warming Potential, which is also termed CO2 equivalent, CO2e). Appendix B details how the emissions were calculated. Section 5.2.6 of the DEIS discusses potential greenhouse gas impacts, and states that the GWP emissions in Table 4.2.1.1-1 are in terms of short tons of CO2e and then converts the emissions to metric tons for comparison to other values in metric tons.
Beatty & Wozniak	26	Alternatives	Action Requested: BLM should revise the DEIS to document and acknowledge in Chapter 1 and 2 that Alternative D is inconsistent with the 2005 Castle Peak ROD in that BLM cannot prohibit all oil and gas development on valid existing leases in the Pariette Wetlands ACEC or in Core Conservation Areas. BLM should note and analyze that the level of surface disturbance Alternative A and the impacts analysis in Chapter 4 are greatly reduced from the 2005 Castle Peak EIS. There is no basis to further restrict Newfield's development based on an artificial cap of surface disturbance when the impacts have actually been extremely low. BLM should also approve Alternative A that authorizes development in the Pariette Wetlands ACEC, not only because Newfield has complied with the specific deferrals of the 2005 Castle Peak ROD, but also because it is consistent with Newfield's valid existing lease rights and the Pariette and Uintah Basin hookless cactus have robust populations and are adequately protected through existing mitigation and conservation measures employed in these areas. Action Requested: In the ROD approving this Project, BLM should authorize Alternative A. Selection of Alternative D or any other modified alternative that	Comment noted.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			prohibits all development in the ACEC would be an arbitrary and capricious decision considering BLM's 2005 Castle Peak ROD	
Beatty & Wozniak	27	Alternative D	Action Requested: The DEIS (Sections 2.2, 2.3.1.1, 2.5, 2.6.1, 2.6.2, 3.15.1.1, 4.15.1.1.1, 4.15.1.4.1 and others) must be revised to reflect that Newfield's federal oil and gas leases are valid existing lease rights, issued prior to FLPMA and ESA, and issued prior to the ACEC designation in the Vernal RMP and Diamond Mountain RMP. In these sections, BLM should reiterate that a subsequently applied restrictions, COAs, and mitigations measures through the Diamond Mountain RMP, Vernal RMP and other NEPA documents may not be used to prohibit oil and gas development on pre-FLPMA oil and gas lease that contains no stipulations or restrictions.	43 CFR 3101.1-2 states that "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific nondiscretionary statues; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year." In addition, FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." Plus, NEPA requires that the lead agency evaluate all reasonable alternatives including reasonable alternatives that may not be within the jurisdiction of the lead agency, and include appropriate mitigation measures not already included in the proposed action or alternatives (40 CFR 1502.14).
Beatty & Wozniak	28	Alternative D	Action Requested: The DEIS (Sections 2.2, 2.3.1.1, 2.5, 2.6.1, 2.6.2, 3.15.1.1, 4.15.1.1.1, 4.15.1.4.1 and others) must be revised to reflect that Newfield may use as much of its valid existing leases as is necessary to develop all of its leased minerals in the ACEC. 43 C.F.R. § 3101.1-2.	43 CFR 3101.1-2 states that "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific nondiscretionary statues; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year." In addition, FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
				use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." Plus, NEPA requires that the lead agency evaluate all reasonable alternatives including reasonable alternatives that may not be within the jurisdiction of the lead agency, and include appropriate mitigation measures not already included in the proposed action or alternatives (40 CFR 1502.14).
Beatty & Wozniak	29	Alternative D	Action Requested: The DEIS should be revised to include an explanation that BLM utilizes many mitigation and conservation measures to protect substantial ACEC values in the Project Area. Despite all of the above protections in place to protect all of the identified values and resources in the Pariette Wetlands ACEC, BLM is still proposing to prohibit all surface disturbance and development of existing leases in the Pariette Wetlands ACEC. Yet, BLM provides no explanation, basis or analysis as to why BLM's proposed no surface occupancy is necessary. BLM's existing mitigation and conservation measures listed above are more than sufficient to protect the ACEC values articulated by BLM in the Vernal RMP.	Alternative D has been substantially modified and includes specific conditions under which development could occur within the ACEC. Please note that Core Conservation Area management guidelines are included in Appendix I of this EIS for reference purposes. Additionally, the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus is included in the Biological Assessment, which is an attachment to Appendix J.
Beatty & Wozniak	30	Alternative D	BLM should not impose the FWS recommended buffers or other, discretional conservation measures, on valid existing leases that do not contain stipulations or restrictions for the Pariette cactus or the Uintah Basin hookless cactus. Protection and conservation of these sub-species can continue under the existing mitigation and conservation measures that have been employed in these areas by Newfield and demonstrated to be effective. Action Requested: The DEIS (Sections 3.10.1.2.1; 4.10.1.1.1; 4.10.1.2.1; 4.10.1.4.1) must be amended to reflect that BLM and FWS are not establishing Core Conservation Areas and restricting Newfield's development of its valid existing leases based on BLM's creation of de facto critical habitat through Core Conservation Areas. BLM should remove all FWS Core Conservation Area restrictions and buffers as they are not required—are merely discretionary recommendations—and are inconsistent with the requirements of the ESA. These de facto critical habitat designations should be removed.	This comment is beyond the scope of analysis. Ultimately, mitigation measures for Sclerocactus will be dictated by the USFWS through the Section 7 Consultation *pro*cess. Please note that Core Conservation Area management guidelines are included in Appendix I of this EIS for reference purposes. Additionally, the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus is included the Biological Assessment, which is an attachment to Appendix J.
Beatty & Wozniak	31	Cactus	Action Requested: The DEIS (Sections 3.10.1.2.1; 4.10.1.1.1; 4.10.1.2.1; 4.10.1.4.1) must be amended to reflect that BLM and FWS are not establishing Core Conservation Areas and restricting development on valid existing leases.	Ultimately, mitigation measures for Sclerocactus, including restrictions within the USFWS' defined core conservation areas, will be dictated by the USFWS through the Section 7 Consultation process. Please note that Core Conservation Area management guidelines are included in Appendix I of this EIS for reference purposes. Additionally, the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus is included in the Biological Assessment, which is an attachment to Appendix J.
Beatty & Wozniak	32	Cactus	Action Requested: The DEIS (Sections 3.10.1.2.1; 4.10.1.1.1; 4.10.1.2.1; 4.10.1.4.1) must be amended to reflect that BLM is not mandating a 300 foot buffer.	The 300-foot disturbance buffer is the USFWS' current guidance for the species. Ultimately, mitigation measures for Sclerocactus will be dictated by the USFWS through the Section 7 Consultation process. Please note that Core Conservation Area management guidelines are included in Appendix I of this EIS for reference purposes. Additionally, the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus is included in the Biological Assessment, which is an attachment to Appendix J.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
Beatty & Wozniak		Cactus	Action Requested: The DEIS (Sections 3.10.1.2.1; 4.10.1.1.1; 4.10.1.2.1; 4.10.1.4.1) must be amended to reflect that Newfield may develop its valid existing leases in the Cactus Core Conservation Areas, subject only to reasonable constraints and buffers to protect cactus. Newfield also requests copies of all FWS guidelines, memorandum, direction or policy what-so-ever that establishes Core Conservation Areas, buffers within Core Conservation Areas and any other restrictions on oil and gas operations related to the establishment or management of Core Conservation Areas.	43 CFR 3101.1-2 states that "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific nondiscretionary statues; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year." In addition, FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." Plus, NEPA requires that the lead agency evaluate all reasonable alternatives including reasonable alternatives that may not be within the jurisdiction of the lead agency, and include appropriate mitigation measures not already included in the proposed action or alternatives (40 CFR 1502.14). Please note that Core Conservation Area management guidelines are included in Appendix I of this EIS for reference purposes. Additionally, the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus is included in the Biological Assessment, which is an attachment to Appendix J.
Beatty & Wozniak	33	Cactus	Action Requested: The DEIS (Sections 2.6.2; 3.10.1.2.1; 4.10.1.1.1; 4.10.1.2.1; 4.10.1.4.1) must be amended to reflect that BLM does not arbitrarily apply any "density ceilings" or surface disturbance thresholds on Newfield's valid existing leases in the Cactus Core Conservation Areas, or on Newfield's access to existing SITLA leases.	43 CFR 3101.1-2 states that "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific nondiscretionary statues; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year." In addition, FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
				will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." Plus, NEPA requires that the lead agency evaluate all reasonable alternatives including reasonable alternatives that may not be within the jurisdiction of the lead agency, and include appropriate mitigation measures not already included in the proposed action or alternatives (40 CFR 1502.14).
Beatty & Wozniak	34	Alternatives	Action Requested: BLM should issue a ROD approving Alternative A because the increased impacts from Alternative A over D do not justify imposition of the onerous prohibition on development and mitigations measures of Alternative D.	Comment noted.
Beatty & Wozniak	35	Alternative D	BLM cannot impose limits upon surface access and development within 100-year floodplains and riparian habitats where there is little to no evidence demonstrating that the impacts from oil and gas development are and cannot be effectively mitigated. BLM must incorporate a discussion of the circumstances under which an exception or modification of the NSO restrictions may occur as provided for in the Vernal RMP.	Comment noted. The referenced Alternative D restrictions have been modified as follows: • No surface disturbance would occur within 500 feet of Pariette Creek or Pariette ponds. • No new well pad-related surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas. • No new pipeline- or road-related surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas, unless there are no practical alternatives or the action is designed to enhance the riparian resources. Unavoidable impacts would be fully mitigated. • For all tributaries that drain directly to Pariette Draw or directly to the Green River, roads and well pads would be set back a minimum of 200 feet from the active stream channel (average 3 feet wide or greater without an associated riparian zone) unless site-specific analysis demonstrates that: o 1) the proposed well or road could be placed on higher terrain above the 100-year floodplain, o 2) the 100-year floodplain can be demonstrated to be narrower than 200 feet in the area proposed for well location; or o 3) the well pad or road can be increased in height to avoid a predicted over-topping 50-year flood. In these situations, the well pad or road would not be placed closer than 100 feet from the stream channel. • Pipelines that cross or are within 100-year floodplains will either be elevated above the predicted 100-year flood event on a pipe bridge, or buried at least 5 feet below the channel bottom or below the predicted scour depth for an equivalent flood event (whichever is deeper) and in conformance with hydrological design practices. • Pipelines that cross stream channels will incorporate a sediment retention system along the construction corridor to minimize movement of sediment into the water courses. These could range from silt fencing and culverts to sediment retention basins, depending on the location. • Newfield will utilize the applicable USFWS BMPs for work in Utah streams where pipelines or roads cross a stream. • Newfield will utilize BLM Hydraulic Considerations for Pipeline Crossings of Stream Channels (prepared by the Utah State Office BLM, Salt Lake City, Utah).

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
				• Road crossings of drainages will be built to accommodate the 100-year flood, typically using at-grade crossings rather than culverts. Crossings will be designed so they will not cause siltation or accumulation of debris, nor will the roadbed block the drainage. Any culverts used will be designed and constructed to allow passage of aquatic species. • As determined necessary on a site-specific basis (based on proximity to a 100-year floodplain), wells with the potential to contaminate surface waters will have automatic shutoff valves. • Any pipeline conveying produced water or other industrial liquid across the 100-year floodplains as conceptually depicted in FEIS Figure 3.6.3.2-1 would be provided with shut-off valves immediately outside the 100-year floodplain on both sides of the crossing. • Storage and parking locations for hazardous materials, lubricants, fuel tanks or trucks, and refueling activities would be a minimum distance of 100 meters from wetlands, riparian areas, and channels with defined bed and banks. Such materials storage or refueling activities would be outside the 100-year floodplains as depicted in FEIS Figure 3.6.2.3-1. • Flow monitors would be installed on produced water pipelines to detect possible leaks. If any of the following impacts are observed, the adaptive management mitigation identified in the long term water monitoring plan (see Appendix H) will be implemented: o increased sedimentation; o increased concentrations of inorganic constituents, including metals; o increased concentrations of selenium, boron, or total dissolved solids; o contamination with petroleum and other organic constituents; o reduction of spring flows; and/or, o reduction of water levels in wells. • Additional measures were identified during the Section 7 Consultation process and are included in Appendix J.
Beatty & Wozniak	36	State Institutional Trust Lands	Action Requested: The DEIS (Sections 4.10.1.1.1 and 4.10.1.4.1) and Alternative D must be amended to reflect that Newfield may develop its valid existing SITLA leases in the Pariette Wetlands ACEC, Cactus Core Conservation Areas, subject only to reasonable constraints and buffers to protect cactus. BLM must remove any restrictions on new roads, pipelines and new infrastructure that are necessary to access and develop SITLA leases.	Alternative D has been modified to show full field development on State and private lands within the administrative boundaries of the ACEC and core conservation areas.
Beatty & Wozniak	37	ACEPMs	Comment No. 40: Section 2.2.12.5 contains a list of ACEMPs that Newfield is committing to. However, the first bullet in Section 2.2.15.5 regarding compliance with the ESA is not an ACEPM. Action Requested: This bullet is merely a restatement of the ESA and should be removed.	Text edited as suggested.
Beatty & Wozniak	38	Mitigation	Action Requested: BLM should include the following language for all mitigation measures in the DEIS, including all those identified in Sections 4.2.2, 4.3.2, 4.4.2, 4.5.2, 4.6.2, 4.7.2, 4.8.2, 4.9.2, 4.10.2, 4.11.3, 4.12.2, 4.13.2, 4.14.2, and 4.15.2: Exception: An exception may be granted if the applicant submits a plan that indicates that impacts of the proposed action can be adequately mitigated or there is no reasonable alternative location to develop a lease and avoid the identified resource, the Field Manager will allow development to satisfy terms and conditions of the lease.	Exceptions, modifications, and waivers are generally developed through the land use planning process and are applied to leases. That language is not necessary for a field development project like this because additional site specific review and NEPA would occur that identify which of the measures identified in the ROD for this EIS would apply in each site specific scenario.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			Modification: The Field Manager may modify condition of approval or the boundaries of the stipulation area if impacts of the proposed action can be adequately mitigated or there is no reasonable alternate location to develop a lease and avoid the identified resource as determined by the BLM. Waiver: A waiver may be granted if, in the leasehold, it is determined that resource of concern no longer exists or has been destroyed, or if all impacts of the proposed action can be adequately mitigated or there is no reasonable alternative location to develop a lease and avoid the identified resource.	
Beatty & Wozniak	39	Alternatives	Comment No. 42: The analysis in the DEIS demonstrates that there is no appreciable difference in the impacts to White Tailed Prairie Dog, Yellow-Billed Cuckoo or Pronghorn under Alternative A and Alternative D and therefore BLM should select Alternative A. The DEIS concludes that neither alternative is likely to result in listing the White Tailed Prairie Dog or the Yellow-Billed Cuckoo. See Sections 4.10.1.1.1, 4.10.1.4.1 & 4.10.1.4.2. Further, the potential impact to Pronghorn within the MBPA can be effectively mitigated through ACEPMs and associated reclamation and other efforts under both alternatives. See Sections 4.9.1.1.2 & 4.9.1.4.2. The essential difference between the alternatives is that Alternative D contemplates a reduced development scenario that unreasonably restricts Newfield's surface access and development rights. *Pursuant to the surface access rights discussion above (Sections X and XIII)* and the fact that Newfield's valid and existing leases predate the Vernal RMP and its associated development restrictions for these species, the DEIS does not provide a reasonable or rational basis upon which BLM may select Alternative D over Alternative A. Moreover, the White Tailed Prairie Dog development buffers identified in the Vernal RMP as well as the Pronghorn timing restrictions cannot be retroactively applied to Newfield's existing leases as they predate the Vernal RMP.	Comment noted.
Beatty & Wozniak	40	Water Rights	Action Requested: BLM should include statements that it does not own, regulate or manage private water rights.	Chapter 2 states "All water used in association with this project would be obtained from sources approved by the Utah State Engineer's Office."
Uintah County	1	Alternative D	It appears that Alternative D is intended to compensate for a lack of clear direction from BLM and the US Fish and Wildlife Service (FWS) for dealing with plant species. Alternative D is billed as a conservation alternative but is also a means for the BLM and the FWS to avoid making an affirmative decision which continues to deny Newfield access to leases upon which they have valid existing rights.	Comment noted.
Uintah County	2	Alternative D	In the DEIS, BLM establishes "core conservation areas" for the hookless cactus. These areas have heightened restrictions on Newfield's development. BLM applies different operational restrictions to the different core areas. BLM's preferred Alternative prohibits new well pads in the "Level 1 core conservation areas." BLM should explain in more detail the concept and science of core conservation areas, how they developed, how they affect valid existing rights and opportunities for the public to participate in their development. Does the DEIS represent the public's opportunity to weigh-in on the creation of these areas?	The core conservation areas were defined by the USFWS, not the BLM. Ultimately, mitigation measures and conditions of approval for Sclerocactus, including restrictions within the core conservation areas, are dictated by the USFWS through the Section 7 Consultation process. Please note that Core Conservation Area management guidelines are included in Appendix I of this EIS for reference purposes. Additionally, the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus is included in the Biological Assessment, which is an attachment to Appendix J.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
Uintah County	3	Mitigation and Alternative Restrictions	In the case of surface disturbance restrictions, is it safe to say that the restrictions are consistent with the Vernal RMP (Appendix K)? Specifically, are restrictions subject to exception, modification or waiver based on site-specific conditions?	Exceptions, modifications, and waivers are generally developed through the land use planning process and are applied to leases. That language is not necessary for a field development project like this because additional site specific review and NEPA would occur that identify which of the measures identified in the ROD for this EIS would apply in each site specific scenario.
Uintah County	4	Land Use Plan Consistency	The DEIS incorrectly represents that Alternative D is consistent with the natural resource management objectives outlined in the Duchesne and Uintah County General Plans and the purpose of the State of Utah's Uintah Basin Energy Zone (UBEZ). The State and the Counties explicitly require that all lands within the UBEZ be developed to prioritize the full development of the underlying oil and gas resources, which cannot be achieved through Alternative D's reduced development plan.	Based on the substantial edits to Alternative D this comment is no longer applicable.
Uintah County	5	Reservation Population	On another matter, regarding matters related to the Ute Indian Tribe, the BLM responded to the County's comment concerning the overstatement of the population of the Reservation. Yet, the BLM did not try to correct the misrepresentation, but simply stated, "because of the highly checkerboard nature of the...Reservation, it is difficult to pinpoint an exact population on the Reservation." And then said the numbers are for baseline analysis purposes only so no change in the text would happen. However, just because the Courts and congress have left the basin residents in an untenable predicament does not then mean that everyone living in the old diminished boundaries should still be lumped into the Reservation. The Ute Tribe's website states, "The Utes have a tribal membership of 3,157 and over half of its membership lives on the Reservation." Land owned by non-tribal members has been defined as non-reservation land. Therefore, it is impossible to have a population greater than the actual tribal members living on the Reservation.	Text has been edited as follows: As of the 2010 U.S. Census, the population of the Reservation was 24,369 residents (U.S. Census Bureau 2011). However, this includes both tribal and non-tribal members residing within general Reservation boundaries, and not just tribal members on tribal lands. There are 3,090 recognized members of the Ute Tribe. Approximately 66 percent of those with tribal membership currently live on the Reservation or on off-Reservation trust land (Utah Division of Indian Affairs 2012). There were 7,788 households on the Reservation in 2010. Of these, 78.4 percent were family households, and 17.8 percent had a householder living alone. The average household size was 3.09 persons, while the average family size was 3.52 persons (U.S. Census Bureau 2011).
WEA	1	Fish	In the case of the fish species, the DEIS states that reduced flow and increased sediment yields in the Green River could cause adverse impacts, yet page 4-54 of the DEIS states, “project-related flow depletion would be negligible”, and Table 4.6.1.1.1.4-4 on page 4-59 indicates that the increase of sediment yields would increase by less than one-tenth of one percent over existing conditions- an insignificant increase.	The FEIS has been edited to reflect that there is little chance of sediment yield to the Green River.
WEA	2	Cactus	Regarding the two species of cacti, page 4-128 of the DEIS indicates that the Proposed Action could impact 1.7% of the total potential habitat for the species, with the percentage reduced to 0.7% after reclamation. Clearly, the Proposed Action will have minimal impact. In contrast, the proposed restrictions in the Preferred Alternative, described on page 2-65, include designating Level 1 and 2 Core Conservation Areas with severe constraints on and prohibitions of surface occupancy, prohibit surface occupancy within the Pariette ACEC, placing significant leased resources off limits (62% of the ACEC, by the DEIS’s own calculation), and provide no opportunity whatsoever for the	Exceptions, modifications, and waivers are generally developed through the land use planning process and are applied to leases. That language is not necessary for a field development project like this because additional site specific review and NEPA would occur that identify which of the measures identified in the ROD for this EIS would apply in each site specific scenario.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			operator to obtain an exception, waiver, or modification. BLM states that directional drilling may be used to provide some access, but this technique cannot be used in all circumstances due to geologic and technical constraints, and should not be used as a default remedy by BLM.	
WEA	3	Alternative D	BLM states on page 2-65 that a primary goal of the Preferred Alternative is "to reduce the amount of surface disturbance from the proposed project by reducing the number of well pads…" As per the Mineral Leasing Act and BLM's own regulations, an operator is allowed to utilize their leases as necessary to develop oil and natural gas resources. An attempt to reduce the number of wells and surface disturbance in the absence of significant resource conflict is arbitrary, contradictory to law, and a violation of valid existing lease rights. In any case, BLM has not explained how reducing the number of wells by 692, from 5,750 (Proposed Action) to 5,058 (Preferred Alternative), or the negligible difference in total potential residual surface disturbance between these Alternatives, represents a significant difference in natural resource protection. However, BLM's intent to marginally reduce the surface disturbance to account for the cacti, Pariette ACEC, and other species will result in the loss of 60,500 million barrels of oil equivalent (BOE) representing over $283 million in lost federal royalties.	Based on the substantial edits to Alternative D, this comment is no longer applicable.
WEA	4	Air Quality	Page 4-27 of the DEIS states that, in addition to Applicant Committed Environmental Protection Measures (ACEPMs), BLM could require additional mitigation measures to curb emissions. We remind BLM that the Utah State Division of Air Quality (UDAQ) reserves jurisdiction over air quality, as per the Clean Air Act. UDAQ has sole responsibility and authority to permit emissions sources and regulate air quality in a non-tribal airshed, and the Environmental Protection Agency (EPA) reserves this jurisdiction for tribal lands, and as such BLM does not have the authority to regulate air quality standards, and should remove any language to that effect from the DEIS. Listed mitigation measures should be revised to conform to UDAQ requirements.	This comment is correct in that BLM does not have authority to regulate air quality. However, BLM can require additional mitigation in response to recognized air quality issues arising from its decisions. BLM can't require this of operations not on BLM-managed land, and the document does not state otherwise.
WEA	5	Air Quality	Page 69 of the Air Quality Technical Support Document (TSD) in Appendix B of the DEIS states that volatile organic compound (VOC) controls and seasonal response plans are the most promising avenues to address winter ozone, yet given that the Uinta Basin Winter Ozone Study is still in process, and the complexities of ground level ozone formation in the Basin are not yet fully understood, it is premature for BLM to make pronouncements on the best methods for control. In the TDS, BLM should explain that the study is still in progress and provide an overview of the parameters and goals of the study.	The statement regarding VOC controls and seasonal response has since been removed from the AQTSD as this statement was in previous versions of the adaptive management language. The current version of the adaptive management language is in Section 2.2.11 of the EIS and this section is referenced by the AQTSD. The current adaptive management contingencies take into account the anticipation of future basin-wide control plans like a SIP/FIP. The proposed mitigations have changed since the DEIS to the FEIS in response to project specific ARMS modeling as well as comments received. The current version of the adaptive management language was edited, by adding the sentence "The winter ozone study is still ongoing."
WEA	6	Air Quality	Also on page 69 of the TDS, BLM states its intention to retroactively apply enhanced seasonal measures for ozone precursor emissions to other recent oil and natural gas projects that contain adaptive management requirements. BLM does not have the authority to retroactively amend RODs for other projects, nor can it amend projects or lease stipulations for other operators, and so this statement should be removed from the DEIS.	Thank you for comment. The referenced sentence has been deleted since retroactive application of air quality adaptive management to other NEPA projects is beyond the scope of this document and it's ROD.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
Representative Matheson	1		The Monument Butte project would allow Newfield to drill as many as 5,750 oil and gas wells in existing oil and gas production areas. It is estimated that the project, as proposed, would create over 500 jobs and $1 billion in economic activity. As a nation, we are moving towards less dependence on foreign fossil fuels and development of these resources in my state has played a vital role in the growth of the economy. Recently, Newfield submitted their own comments outlining their support for Alternative A in DEIS and expressing concerns with Alternative D. I urge you to give to give those comments your full and fair consideration and move in a timely manner to complete the Final Environmental Impact Statement and Record of Decision.	Comment noted.
Multiple Oil and Gas Operators	1		The original lease agreements granted and approved by the Bureau of Land Management for the full field development of this great resource are being infringed upon retroactively, affecting the agreed upon terms in the leases, the Unit Agreement, and the Unit Operating Agreement.	43 CFR 3101.1-2 states that "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific nondiscretionary statues; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year." In addition, FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." Plus, NEPA requires that the lead agency evaluate all reasonable alternatives including reasonable alternatives that may not be within the jurisdiction of the lead agency, and include appropriate mitigation measures not already included in the proposed action or alternatives (40 CFR 1502.14).
Multiple Oil and Gas Operators	2		Approximately 119,000,000 of barrels oil equivalent will become a stranded resource as a result of the requirements set forth in the draft EIS, alternative (D).	The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period and reflected in this comment, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
				determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments reflected in this comment are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary. Based on the extensive edits, this comment is no longer applicable.
Multiple Oil and Gas Operators	3		160 acre pad drilling sights are completely uneconomic, unreasonable, and reflect a misunderstanding of the nature of the (GMBU) reservoir characteristics.	Chapter 2 has been edited to clarify the differences between surface and downhole spacing.
Multiple Oil and Gas Operators	4		These issues will directly affect the hundreds of million dollars that Operators' have vested in the success of the (GMBU).	Socioeconomic impacts of Alternative D have been added to Chapter 4.
Multiple Oil and Gas Operators	5		BLM approved full field development in the interest of preventing waste and correlative rights of the lease holders as well as the government. The BLM granted leases to working interest owners knowing that the purpose of those leases was to develop the oil and gas resources. To retroactively and unilaterally attempt to restrict valid lease rights we believe is a breach by the BLM of the terms of the leases, the Unit Agreement, and the Unit Operating Agreement.	43 CFR 3101.1-2 states that "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific nondiscretionary statues; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year." In addition, FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output." Plus, NEPA requires that the lead agency evaluate all reasonable alternatives including reasonable alternatives that may not be within the jurisdiction of the lead agency, and include appropriate mitigation measures not already included in the proposed action or alternatives (40 CFR 1502.14).
Environmental Protection Agency	1		The Draft EIS acknowledges that contaminants from surface events such as spills, pit and pipeline leaks and nonpoint source runoff from surface disturbance have the potential to enter and impact surface water resources. Consistent with the Vernal Resource Management Plan, the Draft EIS contains a potential mitigation measure stating that "No new surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas unless there are no practical alternatives, impacts will be fully mitigated, or the action is designed to enhance the riparian resources." An additional mitigation measure includes a setback of "a minimum of 200 feet from the active stream channel" for "all tributaries that drain directly to Pariette Draw or directly to the Green River." Our concerns	Alternative D includes the following measures for floodplains and riparian habitats: • No surface disturbance would occur within 500 feet of Pariette Creek or Pariette ponds. • No new well pad-related surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas. • No new pipeline- or road-related surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas, unless there are no practical alternatives or the action is designed to enhance the riparian resources. Unavoidable impacts would be fully mitigated. • For all tributaries that drain directly to Pariette Draw or directly to the Green River, roads and well pads would be set back a minimum of 200 feet from the active stream channel

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			regarding the adequacy of the mitigation measures included in the Draft EIS to protect surface water resources are as follows: • The proposed mitigation measures will help to protect surface waters from flooded well sites and roads, but do not keep surface disturbing activities at a distance to avoid additional impacts from sediment and associated constituents. In addition to reducing sediment impacts, an increased setback would provide a chance for accidental spills or leaks to be detected and remediated before impacts reach water resources as well as some possibility for natural attenuation to occur. In the past five years, 30 spills of crude oil and/or produced water from oil and gas field facilities in Utah (including well production sites and in-field gathering/distribution pipelines) were reported to the National Response Center. Of these, seven (or approximately Y of reported spills) reached water bodies, despite the limit presence of surface waters. To provide increased protection from these potential risks, we recommend that the BLM expand the buffer distance provided by the mitigation measure to 500 feet. • It is unclear whether the mitigation measures as written will protect all Waters of the U.S. (WUS). We are concerned that the emphasis on "tributaries that drain directly to Pariette Draw or directly to the Green River" may not provide adequate protection for an area that has predominantly intermittent and ephemeral water bodies, which may drain directly or indirectly to downstream waters and also could be considered WUS. During storm events or other periods where they are actively flowing, these water bodies could transport sediment and other contaminants to more permanent waterways. For that reason, we recommend that the mitigation measure apply to all tributaries (perennial, intermittent and ephemeral) that drain directly or indirectly to downstream waters, lakes, ponds, reservoirs, springs, and wetland and riparian areas. • The BLM's proposed mitigation language implies that mitigation is considered as part of the alternative analysis for proposed surface disturbance that may impact WUS. However, for purposes of Clean Water Act Section 404 permitting, mitigation can only be considered after evaluation of practicable alternatives and selection of the least environmentally damaging practicable alternative. To address the above concerns, we recommend the Final EIS include the following mitigation language: "No new surface-disturbing activities would be allowed within 100-year floodplains; public water reserves; or 500 feet of perennial, intermittent and ephemeral streams, lakes, ponds, reservoirs, springs, and wetland and riparian areas, unless there are no practical alternatives or the action is designed to enhance the riparian resources. Unavoidable impacts will be fully mitigated."	(average 3 feet wide or greater without an associated riparian zone) unless site-specific analysis demonstrates that: o 1) the proposed well or road could be placed on higher terrain above the 100-year floodplain, o 2) the 100-year floodplain can be demonstrated to be narrower than 200 feet in the area proposed for well location; or o 3) the well pad or road can be increased in height to avoid a predicted over-topping 50-year flood. In these situations, the well pad or road would not be placed closer than 100 feet from the stream channel. • Pipelines that cross or are within 100-year floodplains will either be elevated above the predicted 100-year flood event on a pipe bridge, or buried at least 5 feet below the channel bottom or below the predicted scour depth for an equivalent flood event (whichever is deeper) and in conformance with hydrological design practices. • Pipelines that cross stream channels will incorporate a sediment retention system along the construction corridor to minimize movement of sediment into the water courses. These could range from silt fencing and culverts to sediment retention basins, depending on the location. • Newfield will utilize the applicable USFWS BMPs for work in Utah streams where pipelines or roads cross a stream. • Newfield will utilize BLM Hydraulic Considerations for Pipeline Crossings of Stream Channels (prepared by the Utah State Office BLM, Salt Lake City, Utah). • Road crossings of drainages will be built to accommodate the 100-year flood, typically using at-grade crossings rather than culverts. Crossings will be designed so they will not cause siltation or accumulation of debris, nor will the roadbed block the drainage. Any culverts used will be designed and constructed to allow passage of aquatic species. • As determined necessary on a site-specific basis (based on proximity to a 100-year floodplain), wells with the potential to contaminate surface waters will have automatic shutoff valves. • Any pipeline conveying produced water or other industrial liquid across the 100-year floodplains as conceptually depicted in FEIS Figure 3.6.3.2-1 would be provided with shut-off valves immediately outside the 100-year floodplain on both sides of the crossing. • Storage and parking locations for hazardous materials, lubricants, fuel tanks or trucks, and refueling activities would be a minimum distance of 100 meters from wetlands, riparian areas, and channels with defined bed and banks. Such materials storage or refueling activities would be outside the 100-year floodplains as depicted in FEIS Figure 3.6.2.3-1. • Flow monitors would be installed on produced water pipelines to detect possible leaks. If any of the following impacts are observed, the adaptive management mitigation identified in the long term water monitoring plan (see Appendix H) will be implemented: o increased sedimentation; o increased concentrations of inorganic constituents, including metals; o increased concentrations of selenium, boron, or total dissolved solids; o contamination with petroleum and other organic constituents; o reduction of spring flows; and/or, o reduction of water levels in wells. • Additional measures were identified during the Section 7 Consultation process and are included in Appendix J.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
				The above referenced buffers are in conformance with the 2005 BLM Utah's Riparian Management Policy. Please note that no surface disturbance would be authorized through this EIS, so the cited Clean Water Act Section 404 permitting requirements have not been triggered by this project
Environmental Protection Agency	2		The EPA supports the additional protections the BLM has included under the Preferred Alternative for the Pariette Wetlands ACEC. Pariette Draw is on Utah's 2012 Clean Water Act Section 303(d) List and has a completed Total Maximum Daily Load (TMDL). The TMDL specifically calculates the reductions in total dissolved solids (TDS), boron, and selenium in the watershed that are necessary in order for surface water standards to be met. Disturbance of soils in the watershed may contribute to the existing water quality impairments of Pariette Draw. The BLM's restriction that no new surface disturbance or well pad expansions will be allowed on federal lands within the ACEC (which includes the entire Pariette Draw stream channel and downstream riparian areas) will minimize the mobilization of sediment (and associated constituents) and thereby reduce the potential for an additional load of TDS, boron and selenium to Pariette Draw.	Comment noted.
Environmental Protection Agency	3		Due to the high water needs associated with enhanced oil recovery techniques, the Monument Butte Project includes considerably greater water requirements than other recent oil and gas development projects in the Uinta Basin. As such, we support the proposal in the Draft EIS to obtain 40% to 50% of water needed for enhanced oil recovery operations from recycled sources. We understand that produced water available from production within the Monument Butte field is not anticipated to exceed 40% to 50% of the water needs for the waterflooding operations. However, produced water from other fields or other recycled water sources may be available or become available during the life of the project. For example, based on the Gasco EIS it appears there is likely to be a surplus of produced water in the Gasco field immediately south of the Monument Butte field. To further reduce the consumptive use of fresh water, we recommend that the operator be encouraged to seek additional sources of produced water.	Requiring Newfield to obtain produced water from another operator is unenforceable, and may not be feasible (e.g., Gasco may have other intended uses or Gasco development may proceed more slowly than originally expected due to depressed gas prices.).
Environmental Protection Agency	4		The EPA supports the inclusion of a long-term water resource monitoring plan to detect any unanticipated impacts to surface or groundwater resources in the project area. We understand that the plan provided in Appendix H of the Draft EIS is an example and that monitoring locations will be identified and the plan finalized, with input from the EPA and the State of Utah, prior to release of the Final EIS. We are providing some initial feedback regarding sampling locations in the attached detailed comments, and look forward to working with you to finalize the monitoring plan.	Appendix H has been modified to include additional locations for proposed monitoring stations.
Environmental Protection Agency	5	Air Quality	"..due to the complexity of the mechanisms that form ozone we recommend that emissions are also presented and compared as NOx and VOC individual."	Thank you for your comment. Please see both the Chapter 4 air quality analysis, and the air quality technical support document for individual totals of NOx and VOC emissions.
Environmental Protection Agency	6	Air Quality	"The language in the Draft EIS is somewhat unclear as to the implementation timing of the enhanced measures and seasonal contingency plan. We recommend that the Final EIS state that the mitigation/control strategy as presented in the Draft EIS, will apply to the project upon issuance of the ROD. We also recommend the Final EIS state that if the future modeling shows the need for further emission reduction strategies, the adaptive management	The current version of the adaptive management language is in Section 2.2.11 of the EIS. The current adaptive management contingencies take into account the anticipation of future basin-wide control plans like a SIP/FIP. The proposed mitigations have changed since the DEIS to the FEIS in response to project specific ARMS modeling as well as comments received.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
			strategy will be modified at that time to capture reductions necessary to maintain air quality.”	
Environmental Protection Agency	7	Air Quality	We recommend that the introductory discussion of adaptive management in Chapter 4, Section 4.2.1.1.6 match the discussion in Chapter, Section 2.2.11…	The AMS language has been updated by BLM, and is now consistent throughout the document where the AMS is discussed. However, the introductory paragraph in Section 4.2.1.1.6 is just meant to introduce the enhanced mitigation rather than the entire adaptive management strategy. The full AMS language is only contained in Chapter 2, Section 2.2.11 and Chapter 4, Section 4.2.1.1.6 and the AQTSD reference Chapter 2, Section 2.2.11.
Environmental Protection Agency	8	Air Quality	We also recommend that the specific components of the adaptive management strategy be made consistent…	The AMS language has been updated by BLM, and is now consistent throughout the document where the AMS is discussed. The full AMS language is only contained in Chapter 2, Section 2.2.11 and Chapter 4, Section 4.2.1.1.6 and the AQTSD reference Chapter 2, Section 2.2.11.
Environmental Protection Agency	9	Air Quality	If a Basin-wide regulatory plan is implemented in the future, we recommend that BLM give careful consideration as to whether it is appropriate to delete emission reduction strategies from the project that have been included in the Final EIS and ROD as stated in section 2..2.11 of the Draft EIS.	Thank you for your recommendation. BLM would very carefully consider deleting any emission reducing technologies, and would only do so under isolated circumstances (i.e. technical or cost infeasibility).
Environmental Protection Agency	10	Air Quality	We recommend that the BLM's AMS also include consideration for any non-regulatory, basin-wide control strategies that may be developed.	Thank you for your recommendation. BLM will continue to evaluate all emission reducing strategies available to us.
Environmental Protection Agency	11	Air Quality	..we suggest a minor change to the current language that outlines the frequency of inspection on production sites. …we recommend that the annual FLIR inspection for production sites with tank controls, compressor stations, and gas plants be based on facilities and equipment with the highest potential for fugitive VOC emissions.	Enhanced mitigation language in the FEIS was updated per final mitigations on the Utah Division of Air Quality's website. The updated language does address EPA's comment in that IR camera surveys should be completed on the facilities and equipment with the highest VOC potential.
Environmental Protection Agency	12	Air Quality	We recommend that information presented in the introduction of the AMS in Chapter 2, Section 2.2.11, be amended to more accurately disclose the current understanding of the science surrounding formation of winter ozone in the Uinta Basin. Specifically, there is uncertainty in the statement that, “studies to date are indicating that volatile organic compound (VOC) controls and seasonal response plans are the most promising avenues to address winter ozone formation.” …we recommend stating that current studies indicate that high levels of VOC are found throughout the Uinta Basin, which may be significantly contributing to high winter ozone episodes.	Document edited to delete sentence in AMS language “studies to date are indicating that volatile organic compound (VOC) controls and seasonal response plans are the most promising avenues to address winter ozone formation.” Replaced with EPA language listed “Current studies indicate that high levels of VOC are found throughout the Uinta Basin, which may be significantly contributing to high winter ozone episodes.
Environmental Protection Agency	13	Air Quality	We recommend that the BLM additionally consider whether any level of electrification of the field, analyzed field-wide in Alternative C, could be employed in the Preferred Alternative to further reduce NOx emissions.	Thank you for your recommendation. BLM is strongly considering all emission reduction methods that are reasonably feasible.
Western Environmental Law Center	1	Air Quality	The BLM must take a hard look at air quality	Thank you for your comment.
Western Environmental Law Center	2	Air Quality	With regards to ozone, the BLM indicates the background concentration is 94 parts per billion. According to the AQTSD This is based on the average of most recent 3 years available, 09 - 12, for both Ouray and Redwash. It is unclear what the BLM is referring to in terms of average data for "both the monitors…the correct background ozone concentrations should be the highest 3-year average of the fourth highest annual 8-hour ozone readings for the years 2011-2013, the most recent three-year period and the most accurate indicator of current ozone conditions.”	Revised Table 3.2.3.2-1 to reflect Ouray monitor 2011-2013 data. Changed Ozone discussion on Page 3-9 of DFEIS to reflect new data and reports. Also changed AQTSD similarly.
Western Environmental Law Center	3	Air Quality	“..concerned about BLMs assertions in the Draft EIS regarding the ozone designation of the Uinta Basin under the Clean Air Act.”	The Uinta Basin is designated as attainment/unclassified for all criteria pollutants (3.2.3.2). This is a factual statement that is easily confirmed.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
Western Environmental Law Center	4	Air Quality	"For PM2.5 it also appears the BLM averaged data from the Ouray and Redwash monitors to determine to determine background air quality for both the annual and 24-hour NAAQS…BLMs reliance on eight high values is not is not consistent with calculating annual 98th percentile values."	Because both Ouray and Redwash monitors are close to the Project Area, it is reasonable to take an average of the two monitors to capture existing air quality. The background values used in the EIS are not used to show attainment or non-attainment, but rather just a demonstration of what the existing conditions are. The values used in the FEIS are the 98th percentile values from the EPA Air Data web site which are consistent with the NAAQS. Table 3.2.3.2-1 was revised to reflect 2010 – 2012 data for Redwash and Ouray monitors rather than mid-year 2009 - midyear 2012 data so that the 98th percentile data could be used (2013 data not available at the time of revision). Similar edits to AQTSD. Note: numbers in Table 3.2.3.2-1 were incorrect as they did not match AQTSD which was correct at the time of the DEIS.
Western Environmental Law Center	5	Air Quality	"For PM10…it is unclear how a monitor located in a disturbed urban area in the City precludes using its data…Dragon Road monitoring site…exceedances were shown in 2012."	Dragon Road monitor only has two years of data and not close to project area. There is very little PM10 data in general for the project area. Roosevelt monitor location only has 8 months of data in 2012, so also not enough for the three year average. The NAAQS average period is "not to be exceeded more than once per year on average over 3 years
Western Environmental Law Center	6	Air Quality	For the 1-hour nitrogen dioxide, BLM averaged data from Ouray and Redwash monitors, which is inconsistent with design values are calculated under 40 C.F.R. § 50. BLM's reliance on eighth high values is inconsistent with the 98th percentile. The Fruitland monitor in Duchesne County showed 1 hour nitrogen dioxide NAAQS exceedances in 2013.	Because both Ouray and Redwash monitors are close to the Project Area, it is reasonable to take an average of the two monitors to capture existing air quality for the 1-hour average. For the annual value, the highest value was used as the NAAQS does not take into account multi-year averages. The background values used in the EIS are not used to show attainment or non-attainment, but rather just a demonstration of what the existing conditions are. The values used in the FEIS for the 1-hour average are the 98th percentile values from the EPA Air Data web site which are consistent with the NAAQS. There is no monitor on the EPA air data website located at Fruitland to use for background data. Table 3.2.3.2-1 was revised to reflect Ouray and Redwash monitor 2011-2013 data for 1-hour average data. Also change AQTSD similarly. Annual NO2 data will use 2010-2012 data from both monitors as 2013 data for the annual mean is not reported on EPA website.
Western Environmental Law Center	7	Air Quality	"AQTSD…does not appear to take into account cumulative emissions from nearby pollutant emitting activities that may impact near and far-field air quality."	The modeling protocol was reviewed by EPA and an interagency technical review group and found to be sufficient and representative of best practices.
Western Environmental Law Center	8	Air Quality	"Winter time ozone cannot be modeled…this assertion is simply not correct…"	At the time of the DEIS, it was well recognized in the scientific community that winter ozone could not be modeled at that time. BLM is currently working on advancing the science of winter ozone modeling through extensive collaboration and development of the tools necessary to accomplish this. Between the DEIS and FEIS, the ARMS modeling platform became available for modeling ozone. Results from the general ARMS model and project specific modeling effort have been generated and conclusions applied for this EIS through the adaptive management in Section 2.2.11. Although the ARMS modeling platform is available, it is still recognized that more research needs to be completed to fully understand the mechanics of winter ozone.
Western Environmental Law Center	9	Air Quality	"EPA has determined human emissions of greenhouse gases are causing global warming... the agency must consider not only the cumulative impact of the GHG emissions authorized by the proposed action, it must also consider those emissions combined with other activity in the area."	It is currently not possible to define project-specific impacts from the emissions of greenhouse gases to global climate change. This is explained in the EIS, and is consistent with other NEPA nationally.
Western Environmental Law Center	10	Air Quality	"...address the serious issue of methane emissions and waste in the oil and gas production process…estimate of the projected methane emission rates from drilling and production activities..."	Many of the ACEPM's disclosed in the EIS significantly reduce potential fugitive emissions of methane (i.e. VOC controls).
Western Environmental Law Center	11	Air Quality	"...Mineral Leasing Act's duty to prevent (methane) waste..."	Many of the ACEPM's disclosed in the EIS significantly reduce potential fugitive emissions of methane (i.e. VOC controls).

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
Western Environmental Law Center	12	Air Quality	Methane mitigation measures should be adopted and analyzed	Many of the ACEPM's disclosed in the EIS significantly reduce potential emissions of methane (i.e. VOC controls).
Western Environmental Law Center	13	Air Quality	The capture of methane is critical due to its global warming potential	Many of the ACEPM's disclosed in the EIS significantly reduce potential emissions of methane (i.e. VOC controls).
Western Environmental Law Center	14	Air Quality	The BLM must consider the resilience of our communities and their ability to adapt and respond to climate change	It is currently not possible to define project-specific impacts from the emissions of greenhouse gases to global climate change. This is explained in the EIS, and is consistent with other NEPA nationally.
Western Environmental Law Center	15	Air Quality	The draft EIS fails to analyze or assess air pollution impacts, including greenhouse gas emissions, from connected actions: -truck traffic -oil refining -oil and gas combustion impacts -offsite trucking and refining	Those activities that are within the scope of this EIS are included in the emissions impacts. In addition, in related to dispersion modeling comments, the modeling protocol was reviewed by EPA and an interagency technical review group and found to be sufficient and representative of best practices.
Western Environmental Law Center	16	FLPMA	BLMs proposed action will not comply with the Federal Land Policy and Management Act	FLPMA directs the BLM to manage public lands" in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use". FLPMA also has a multiple use mandate that requires "a combination of balanced and diverse resource uses that takes into account the long term needs of future generations for renewable and non-renewable resources, including but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.
Wild Earth Guardians	1	Air Quality	The need for the BLM to address the ozone impacts of the Monument Butte Oil and Gas Project is three-fold. First, ozone is a harmful air pollutant that poses myriad health risks. Elevated ozone in the Uinta basin not only puts local communities at risk, it puts visitors to public lands in the region at risk. Second, the BLM is obligated under the Federal Land Policy and Management Act ("FLPMA") to ensure that its actions comply with federal air quality standards. *See* 43 U.S.C. § 1712(c)(8). Thus, BLM has an obligation to ensure its approval of the Monument Butte Oil and Gas Project does not cause or contribute to violations of ozone air quality standards. And third, the BLM is required under NEPA to ensure that it analyzes and assesses environmental impacts to ensure a well-informed decision. The need to ensure an adequate ozone analysis is part and parcel with ensuring a well-informed, and therefore legally adequate, decision under NEPA.	The DEIS specifically and extensively discussed the potential for ozone formation during the winter as the result of emissions from oil and gas operations. The studies referenced by the comment (published in March and April 2014) confirm the statements in the DEIS regarding ozone formation and are consistent with what is stated in the DEIS. The studies noted by the commenter also discuss the need for additional data and research. The BLM has developed a region-specific photochemical impact model that can be used to quantify the impact of oil and gas operations, and the BLM has specified in the EIS the actions that will be taken to reduce emissions in the Basin. Additionally, a project specific ozone model has been generated using the ARMS platform and the results are summarized in Section 4.2.1.1.5.

Attachment 2 - Monument Butte EIS Responses to Comments (RTCs) Received by the BLM on the Draft EIS				
Commenter	**Comment #**	**Topic / Resource**	**Public Comment***	**BLM Response**
Wild Earth Guardians	2	Air Quality	BLM/s analysis of wintertime ozone air quality impacts in the DEIS is significantly flawed. The Agency makes no effort to analyze or assess impacts, whether qualitatively or quantitatively. The BLM asserts in the DEIS that the contribution of emissions from the Monument Buttes Oil and Gas Project to wintertime ozone concentrations "cannot be determined at this time." (DEIS at 4-16.) New studies indicate that increased VOCs will contribute to ambient ozone exceedances.	The DEIS specifically and extensively discussed the potential for ozone formation during the winter as the result of emissions from oil and gas operations. The studies referenced by the comment (published in March and April 2014) confirm the statements in the DEIS regarding ozone formation and are consistent with what is stated in the DEIS. The studies noted by the commenter also discuss the need for additional data and research. The BLM has developed a region-specific photochemical impact model that can be used to quantify the impact of oil and gas operations, and the BLM has specified in the EIS the actions that will be taken to reduce emissions in the Basin. Additionally, a project specific ozone model has been generated using the ARMS platform and the results are summarized in Section 4.2.1.1.5.
Wild Earth Guardians	3	Air Quality	Points out that the 2013 ozone data is now certified by the EPA and shows higher levels than are in the DEIS.	Revised Table 3.2.3.2-1 to reflect Ouray monitor 2011-2013 data. Changed Ozone discussion on Page 3-9 of DFEIS to reflect new data and reports. Also changed AQTSD similarly.

*This matrix summarizes substantive comments received during the public comment period.